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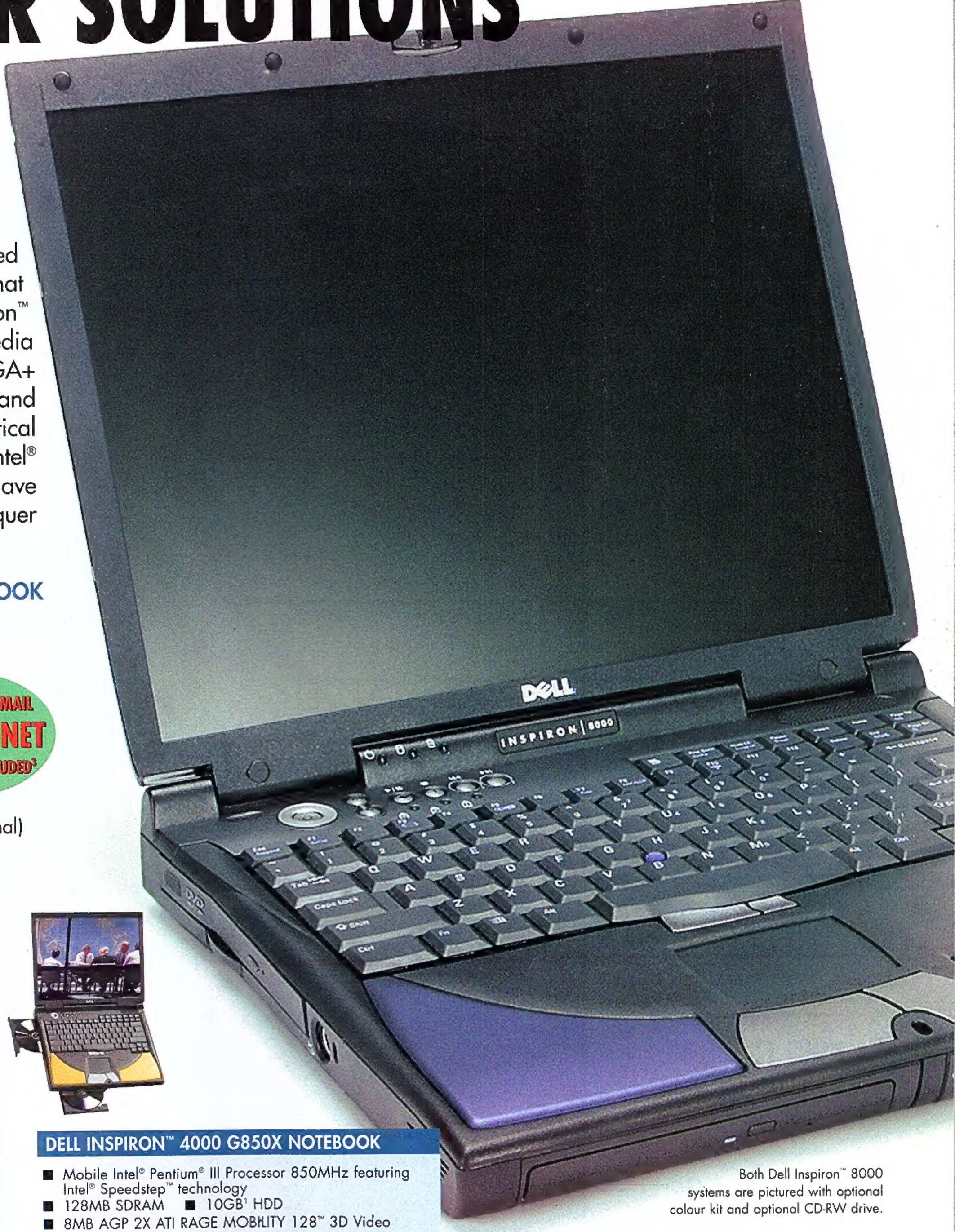

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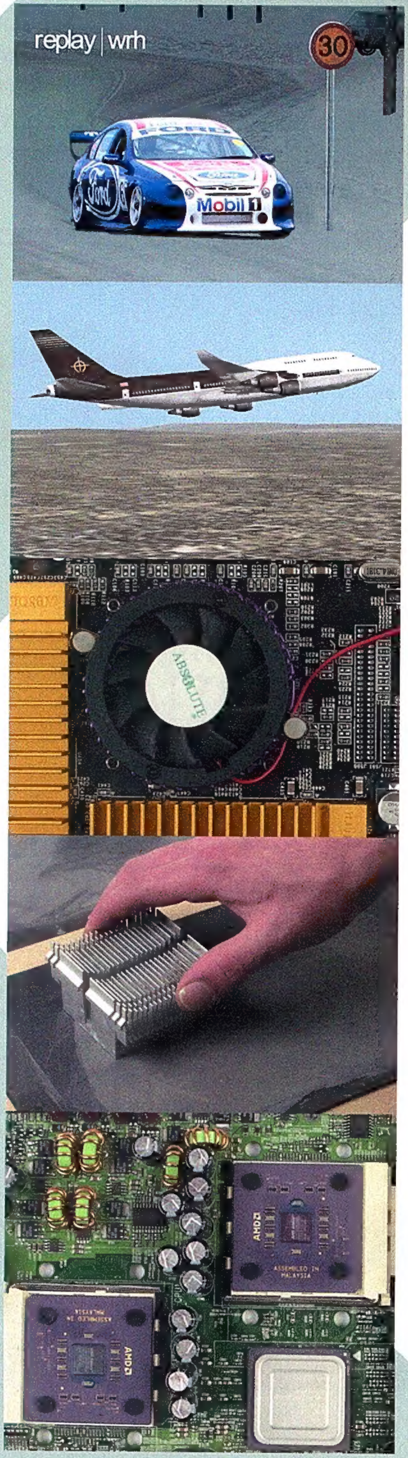

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You've got problems, we've got answers. Ask us anything! This is much better value than hiring your own personal techie.

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The letters just keep pouring in we only have room for a few though, so come feast upon the best of atomic reader's big brains.

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The thinking man's way to get atomic. Subscribe this month and you could walk away with an eWear mp3 player. get in now, because in just 3 months the atomic subs price goes up $10 to $49 for a year. NOTE: The cover price stays the same - don't panic!

COMPETITION 96

Gee wizz, a FREE GEFORCE 3! Super! It's the smokin wooden boxed Morpheus too! Gasp, five copies of I-War 2. Gadzooks! More Panasonic mp3 goodness too. Wow. If we gave anything else away we'd hurt the economy!

THERE IS A SPOON

Let's stop and take a breath. Atomic has entered the second half of our first year. What have we accomplished? There are the obvious basics: providing half-a-dozen Australians jobs and the creation of a beautiful, magnificent, stupendous magazine. We have achieved a high degree of boss happiness too, allowing us to continue our mischievous ways. We have stimulated the magazine marketplace, resulting in some flattering and amusing attempts at emulation of our way, and we're just about the only computer magazine in Australia that is increasing its sales each month.

But none of that is much of an achievement, not in the face of the one that really blows us away. You fine lot.

Atomic has attracted like-minded people and the community of atomicans is strong. We stick together, we have standards and we are quick to encourage dark newbies in a friendly way. We have standout individuals that we're especially proud of and we welcome new friends. Our playgrounds are the atomic forums and the #atomicmpc (Austnet) IRC room. Sometimes we talk about hardware, sometimes games, usually it's just talk, about whatever. About crazy shit, about each other, about stuff and about spoons. Every day new faces appear and generally like what they see, and it grows. I invite you to join us, if you haven't already.

I'd planned to list as many special atomicans as possible in this editorial. I started compiling a list but realised my mistake. It's impossible to list everyone. People would get left out and hurt, and we're not an elitist community, forget that idea.

What I do have to do though is thank our Heros. Present and future. These people are identified by atomic staff during daily forum exploring and IRC play. It's not an elitist rank, rather it's a recognition of atomicans that hold the community especially close to heart. They hold it all together. They are critical mechanisms in our toasty little social dynamic. They politely help curious newbies and firmly smack down any naughties. They are funny and smart. Heroes have no special admin powers, but they do have the respect of the community, which is a far better thing. They're simply Heroes. They are: Aquillae, Aurak, BobTheMonkey, DNA, evolutioned, Faldo, FrozenPea, g_day, Kremlin, Mael, Nitrate, pbkg, Phat Dixx, Phr33x, po-zest, pom, Prophey, Protozone, Tux, Wilkshake, Wok, Zainny and Zeddicus.

There will be others, perhaps you?

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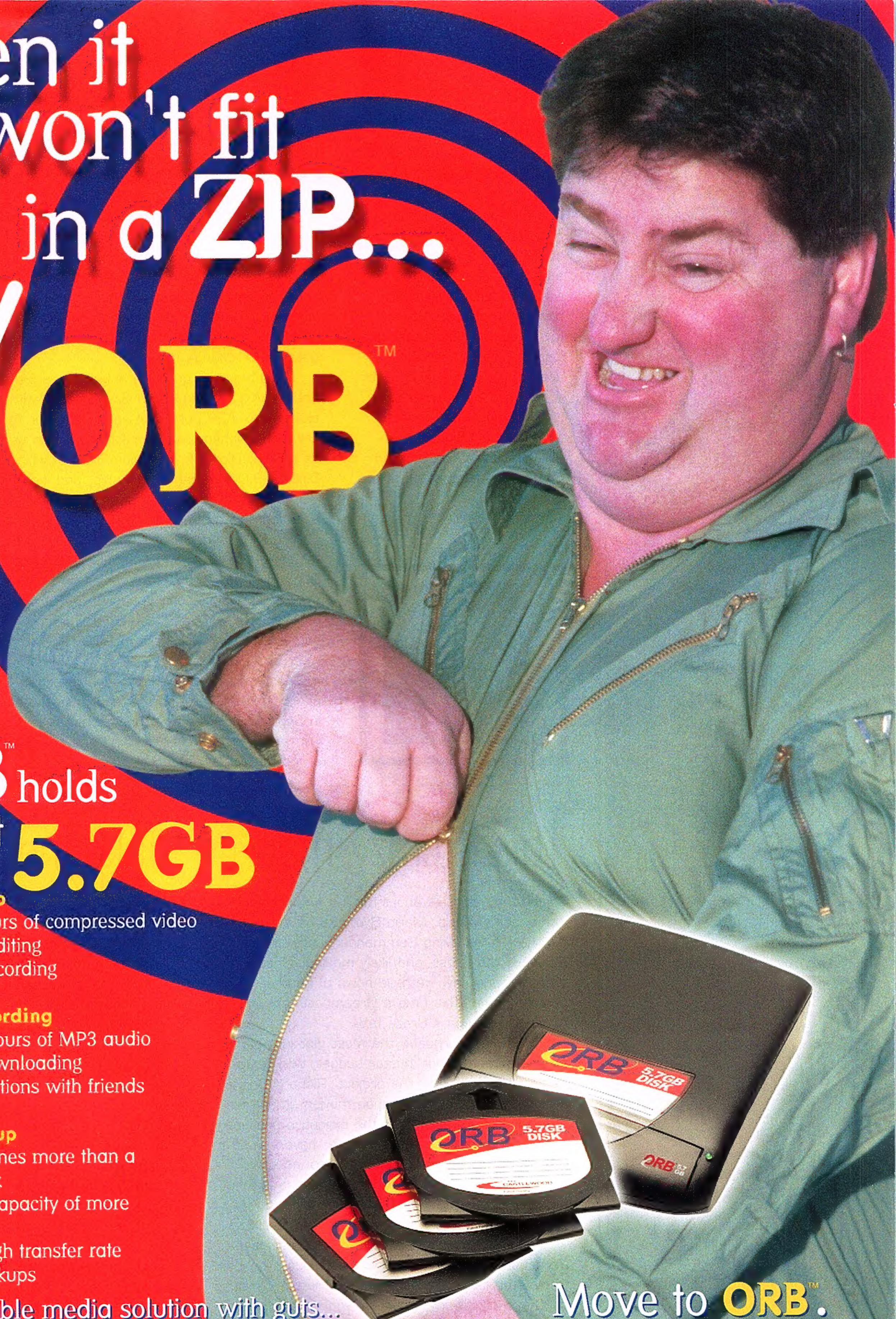

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Short Circuits

This month should herald the appearance of cheaper, four-layer i850-based motherboards for the Pentium 4. The high price of existing boards is due to the complicated six-layer construction. In order to reduce the complexity of the board, there are some strange tips and tricks needed to accommodate the changes (expect to see two RIMM slots sitting perpendicular to the other two).

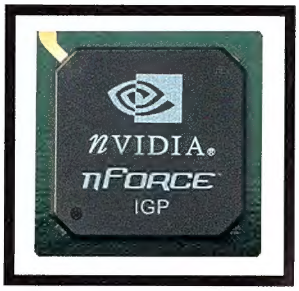
The JEDEC has approved the specification for DDR-II, which, disappointingly, is not called 'the revenge of DDR'. Appearing sometime in 2003, the new specification should first come in PC3200 and PC4300 variants, which run at 400MHz and 533MHz respectively. The standard will hopefully run at a lower voltage than the current one. This does not mean the end of DDR RAM as we know it. The new PC2700 DDR RAM (which uses the current standard) will start appearing towards the end of this year.

Cisco's new 7400 Router owes a large debt to its Sydney-based R&D team. The 7400 uses a new processor known as PXF (Parallel eXpress Forwarding), a programmable processor for accelerating network services. The Sydney R&D team played a critical role in the invention and development of the PXF, known internally as the toaster, due to its heat-generating capabilities. The processor allows network admins to configure the router to add a series of extra services with none of the traditional performance hit, and works in a similar way to the programmable shaders used in the latest, DirectX 8.0-compliant video cards.

Show of nForce

Deep in the heart of the Brazilian rainforest there is someone who hasn't heard about the Xbox, and that is probably because they are have been stuck up a tree for a year protesting against logging. Hippy. Microsoft's upcoming console owes a lot to its partnership with NVIDIA, which has created not only the graphics hardware, but also most of the internal electronics of the console.

NVIDIA has taken this technology and struck out into the tough motherboard chipset market with the nForce IGP (Northbridge) and MCP (Southbridge) chips. The nForce is a solution for AMD processors and incorporates a whole swag of features that should redefine the way we think about the term 'integrated'. Historically, integrated graphics and sound have been synonymous with slowness, something that nForce has the potential to change forever.



The integrated graphics solution is a GeForce2 GPU (note: not an MX) running on an 8x AGP bus, with an optional external 4x AGP port. The sound chip, or APU (we prefer to call it the Nahasapeemapetilon) comes in standard AC 97 audio or a Dolby Digital 5.1 version. This is set to be the first fully DirectX 8.0-compliant audio chip, and incorporates Sensaura 3D audio with the help of some ex-Aureal engineers. The MCP also contains an integrated 10/100 Ethernet controller.

The MCP and IGP utilise AMD's new HyperTransport technology to ensure fast, reliable I/O speeds, touted at 800MB/s between the two chips. In keeping with the focus on speed, the chipset only supports DDR RAM, and uses what NVIDIA calls TwinBank, two 64-bit memory controllers that can combine to run two sticks of DDR RAM at an effective bus width of 128-bit.

Most major motherboard manufacturers have announced nForce-based boards in the lead-up to the planned appearance in September. When the boards appear, rest assured that we will give them a good thrashing and see whether the fancy acronyms actually mean anything.

This is crazy, man

There's nothing new about turning a successful game into a movie. Mario Brothers hit celluloid, so did the ill-fated Wing Commander. Lara Croft: Tomb Raider is the latest, and likely most successful example, and now we have news of another popular game. This time a Dreamcast title makes it to the big screen – Crazy Taxi.

That's right, arguably the most plot-light game ever is getting a blockbuster budget, with a big-name director behind the project. Richard Donner, director of the Lethal Weapon movies among his dozens of film credits, and the executive producer of the recent smash *X Men* movie, have agreed to take the project's helm. According to industry paper The *Hollywood Reporter*, Donner is looking forward to pushing film-making technology to the limit to make the film as immersive as possible.

Of course, we at atomic have our own ideas. Perhaps Robert DeNiro should be brought onboard to play the taxi driver, or perhaps Martin Scorcese can have a walk-on cameo – if you haven't seen *Taxi Driver*, stop reading and watch it now. Or perhaps the movie could be taken a step further, tying it into both the game and the Scorcese classic. I can see it now . . .

Taxi Driver II: Crazy Taxi. Ah, Hollywood.

Take the strain

Silicon, long seen as the saviour of computing thanks to its wondrous non-conductive qualities, is now beginning to look a little old, and, frankly, is starting to hold back processor advances. Many developers believe that we are now rapidly approaching the limits of the medium, but thankfully IBM is putting in the hard yards to make sure that silicon continues to remain the basic building block of chip design.

'Strained' Silicon is the latest tech toy from IBM's research and development department, and the process can boost chip speeds by up to 35% without the need to shrink transistor size. The process is simple: deposit your silicon on top of its substrate, but just make sure that the substrate's atoms are spaced further apart than the silicon's atoms. The silicon atoms above stretch to match the substrate below. This straining means that electrons experience less resistance and flow much faster.

Now why didn't we think of that?

Codies do it Aussie style

In a desperate bid to feed the starved meat-eating side of his personality, UK Codemaster producer Clive Moody recently paid a visit Down Under to our land of disease-free beef. Actually, he was here to promote the newest licence to be acquired by Codies, the Australian AVESCO V8 Supercar licence, but that didn't stop him from feasting on our foot-and-mouth-free burgers while he was here.

The mighty Australian Holden versus Ford series will undoubtedly go down a treat with Aussie fans. When quizzed about the feel of the racing that the game will feature, Moody said we can expect tight and fast racing, with an emphasis on realism. The game will also be using a totally new 3D engine, and it is looking like one sexy engine. Each car is comprised of between three and four thousand polys with full damage modelling.

After quizzing him about the new AVESCO racer, our questions soon turned to the Xbox and PS2. After all, it's not often that we get to pick the brains of someone that has such intimate knowledge of these two next-gen consoles. According to Moody, we should see some quality PS2 titles being released in the immediate future. As we have heard, the PS2 has been a bitch to program for, and it has taken this long for Codemaster's programmers to get their heads around the hardware.

This is in direct contrast to the Xbox, which, by Moody's reports, is a joy to program. Its similarity to the PC, combined with Microsoft's amazing regard for developer input, means that getting impressive results out of the Xbox is much easier than the PS2.

As for the full-scene anti-aliasing (FSAA) capabilities of the two consoles, apparently, enabling FSAA on the PS2 isn't as simple as Sony has made out. In fact, it's so difficult that Codemaster has had to focus several people on this single problem. This is totally opposite to the Xbox, which has full FSAA support that can be easily enabled.

Moody couldn't give us a release date, but said most racers take around 18 months to create. Given this we're guessing that the Shell Championship V8 Supercar simulation probably won't be released until at least late 2002. Anyone want to bet that it will be released on Xbox before the PS2?

1 x Zero = 300

When *Pearl Harbor* bombed into Australian cinemas on June 7, audiences were awed by the shot of a Japanese bomb spinning down toward the USS Arizona, penetrating four decks and finally coming to rest in the ammo room. There's a horrific pause, and then the mighty Arizona is lifted clear out of the water, blown in two as more than a thousand sailors perish.

The eye-defying CGI was done by no other than George Lucas's Industrial Light and Magic. That sequence was created by helicopter shots, which were then melded together using ILM's Silicon Graphics O2 workstations.

Silicon Graphics O2 workstations run on a 64-bit MIPS-R12000A processor at 400MHz. They come with 2MB of L1 cache and up to 1GB of DRAM for the O2 Unified Memory architecture. The O2 Unified Memory architecture makes the GeForce3's lightspeed memory architecture look like a baby's toy; the O2 is truly unified, 1 GB of DRAM is accessed by all subsystems from CPU to GPU, and compression to I/O.

Pearl Habor wasn't all digital, though. The momentous effort involved blowing up 17 ships, with vintage planes flying overhead and 350 bombs exploding in less than seven seconds, all blended seamlessly from film to GPU. The hundreds of Japanese Zeros you saw were actually one. The sole remaining Zero left from WW2 was filmed and digitally reincarnated using modified software created for *The Phantom Menace*. From here, one turned into more than 300 with digital battleships floating on digital water using this technology.

The sinking of the USS Oklahoma was created using the world's largest gimbal. Only a quarter of the ship was real; the rest of the ship as well as the sailors are digital extensions done by ILM. 'From an engineering standpoint, it was the biggest thing that ever happened in Hollywood,' remarked Lead special effects coordinator, John Frazier.

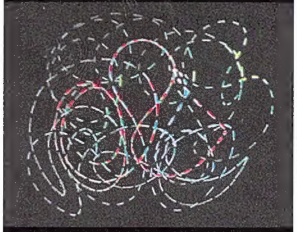
Short Circuits

As you no doubt have heard, Telstra BigPond recently announced its new Acceptable Use Policy (AUP) for its residential broadband services. At the centre of the controversy is a flat 3GB cap on a connection that has ostensibly been marketed as an 'unlimited' service. While it has been claimed that those who are making the most noise are the small percentage of users abusing the service, the number of signatures accumulated on two online petitions would suggest otherwise. At the time of writing there were a total of 7,239 signatories on the 'Freedom Plan – No download caps' petition at www.petitiononline.com. And www.broadband.org.au has recently submitted a petition with 1,362 signatures to the ACCC, the TIO and Telstra. Meanwhile, angry customers are organising funds for full-page anti-Telstra newspaper advertisements and even protest marches, a response that Telstra admits it had not anticipated.

Industry bigwigs Maxtor, Compaq, Microsoft and VIA have all announced their support for the next-generation ATA interface for hard drives. The current specification falls over at 137GB and the new 'big drive' interface provides support for drives up to 144 petabytes in size. To put it into context, one petabyte equals about 1,000 terabytes or 1,000,000 gigabytes. On a more practical level, you can fit roughly 17 million hours of MP3 audio into one petabyte, which means more Limp Bizkit that any human can handle. That amount of storage is astronomical, but hopefully there will be no need for a new standard for at least 20 years to come.

Short Circuits

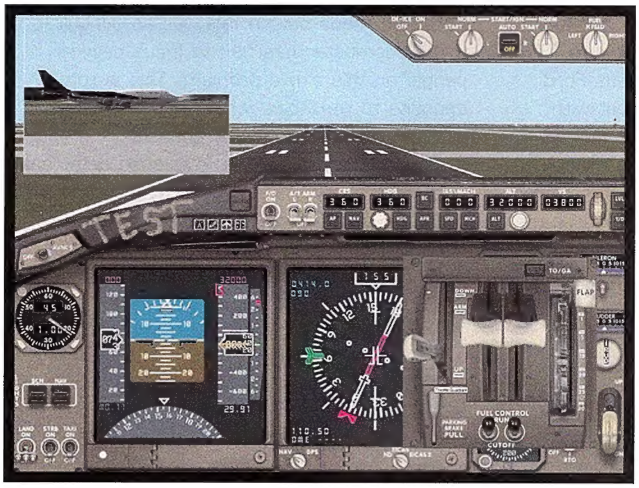
Scientists at Lucent have recently published findings in the prestigious journal, *Nature*, about the theoretical limits of optical fibre. Each strand of optical fibre can cope with 100 terabits of data running through at once – exactly the sort of bandwidth you need to keep your 144 petabyte hard drive ticking over. One hundred terabits translates to 20 billion single-page emails, or one billion single-page emails with attached video of someone getting attacked by a goat, or enough bandwidth to exceed your Telstra broadband AUP by 12,797GB in the space of one second.



The Trialware Professional Association, an industry body designed to protect the rights of smaller software developers, has announced the launch of its Crack Killer program, which is not an anti-drug vigilante group, but a program designed to shut down the plethora of crack and warez sites on the Net. The program is aimed to look after the rights of small companies that cannot afford a dedicated anti-piracy policy, but are probably the most damaged by exploitation of their distribution. Crack Killer involves volunteers who search the Web for such sites, as well as an email address for concerned members of the public to submit links to crack sites. The Trialware Professional Association can be found at www.trialware.org **and sites can be submitted to** nopiracy@trialware.org.

Seven snore seven

Microsoft is putting the final touches on the latest opus of its Flight Simulator series. One of gaming's oldest and most familiar faces is getting the most dramatic makeover in its long history. We're the only Australian mag to have been given a beta, and the last couple of weeks have seen some intensive testing by Atomic Airlines. All-new bumpy terrain is pleasing. The flight sim environment has always been disappointing, but the community has tolerated that in the name of accurate flight modelling and deep navigation systems, as they're considered far more important. Now we've got pretty landscapes and an astounding enhancement of the gameworld with full incorporation of an ATC (Air Traffic Control) system. When it's launched, gamers will be able to log on to a Microsoft server, don a headset and, thanks to DirectX 8.0 voice comms, be a flight controller at whatever airport they want, directing aircraft flown by other flight sim users. We're expecting some emotional exchanges between pilots that feel their ATC isn't doing a proper job, and the ATC who could well be a naughty spammer.



Airline piloting is serious stuff, though, and anyone not doing it justice will be blacklisted.

There's a swag of boring new light aircraft, but the 747-400 makes up for that. There have been about 1 billion third-party 747s created for Flight Sim, so there's some real pressure on Microsoft to outdo them all, which is what we expect. Microsoft's Great Metal Bird is pretty sweet; the engine sounds are so similar to the noise you get inside a 747-400 that it actually sends you to sleep, which is nice and accurate. It's a beta and there's clearly work to do. We were able to take the 747-400 to almost 60,000ft and maintain cruising speed of Mach 0.9+, which surely cannot be right.

Flight Sim 2002 is right on track to own the community. It's a monster.

WHAT'S HOT	WHAT'S NOT
Palomino AMD continues the charge	**Tualatin** Too little, too late. Again
3D Power The new kid on the video card block	**Gigabyte** Trying to pull a swift one
nForce APU Redefining integration	**Telstra AUP** Redefining disintegration
Petabyte All the pr0n you can handle	**Gigabyte** Barely enough room for Solitaire
Operation Flashpoint Immersive single-player experience	**Operation Flashpoint** No decent multiplayer for a few months
Gorillaz The return of the Superband	**Travelling Wilburys** We still haven't forgiven them

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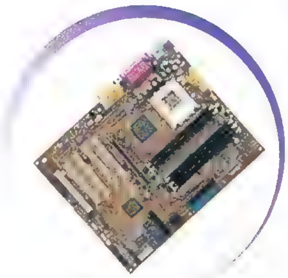

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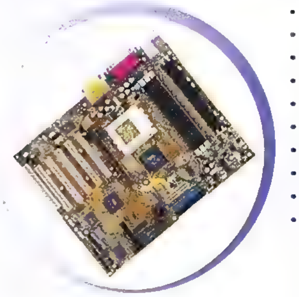
- *C-Media 4-Channel Audio(optional)*
- *4 x PCI, 1 x AMR/PCI Shared*
- *ASUS iPanel Family Support*



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- *2 x SDRAM DIMM(PC133) for 2GB Maximum*
- *AGP Pro(AGP4X Compatible) Slot for Graphics*
- *Dual Channel ATA100 IDE & Raid 0, 1*
- *C-Media 6-Channel Audio(optional)*
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Specifications are subject to change without notice. For actual specifications, refer to your motherboard.

XPonentially troubled

Ashton Mills isn't as happy as he looks, blame Bill, again

Some of the very aspects of the Windows 9x/Me operating systems that we love to hate – the 'dumbed down' facets such as simple memory management, reliance on 16-bit code, and the sort of things that lead to rebooting at least once a day — can sometimes been seen as an advantge as well as a disadvantage. The Windows 9x/Me series is a lightweight, simple desktop operating system. But all that is about to change with the release of Windows X. Microsoft is promising a fast, stable and efficient desktop OS based on Windows 2000 technology. Of course, Microsoft promises this with every Windows release, but perhaps this time they'll actually deliver. However, while there's little dobut the fully 32-bit operating system will provide stability and performance yet unheard of in the Windows desktop arena, the act of growing up into a mature, more complicated operating system brings with it the type of issues mature operating systems have to deal with.

According to Steve Gibson of Gibson Research Corporation, one of the new features of XP is a fully implemented TCP/IP stack that brings Windows XP up to par with TCP/IP stacks from Unix-based systems. And herein lies the problem. A fully implemented TCP/IP stack includes Full Raw Sockets, a back door into the TCP/IP stack originally designed for research purposes and, under Unix systems at least, accessible only by the root (administrator) user. According to Gibson, under certain circumstances, this allows a user to re-write the source address of a packet of information. That is, make it seem like a packet originiated from anywhere but its actual source, otherwise known as spoofing.

So why is this important? Well, it's not really, apart from giving crackers the ability to launch all kinds of attacks against machines on the Internet... and completely cover their tracks.

Currently, one of the easiest and most effective attacks against machines online is the DoS, or denial of service. It's a simple principle: flood a machine with so much information it crashes the server. DoS attacks are the gleeful playground of sKripT KidDiEs, the branded prepubececent, power-hungry, teenagers who've discovered how easy it is to use scripts to flood servers. The smart ones know to try and crack multiple machines on the Web before launching an attack, thereby making it harder to trace the source.

Now, any Unix machine that's publicly available on the Internet normally has strict security and a firewall in place that not only limits anyone getting in, but also limits what goes out. Only the most skilled and dedicated crackers are able to penetrate online servers from which they can then launch an attack against another server.

Windows XP machines, however, won't be as securely configured. Let's face it – 99% of them will be your average Joe dekstop user who just happens to have a broadband or modem connection. But this isn't directly the problem. Unlike Unix or Windows 2000-based machines, there aren't going to be any easily crackable services such as Telnet or FTP running on Windows XP. But what about those script kiddies with a brand-new XP installation? Do they need to server hop, assuming they even have the knowledge to do so, before launching an attack? Not anymore – just spoof the IPs of the flood packets from their machines. And, according to Gibson, it's not even hard to do.

This is the argument Gibson discusses at length with Microsoft. You'll find it on his page at grc.com/dos/winxp.htm. Whether the problem is going to be as prolific as he says it will remains to be seen, but he does have an interesting point. A fully fledged TCP/IP stack is required for a server platform, but is it required for a desktop? We'll soon find out, because despite informing Microsoft of the risks, Gibson was told that the new TCP/IP stack is here to stay.

'Windows XP machines, however, won't be as securely configured.'

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A day at the hyperbole

Big words are good, Tim Dean likes them. NVIDIA puts the 'hyper' into 'hyperbole'.

There was a time, a couple of months ago, when I was trying to put together an article on some kind of tech thing about something (I write a lot of these things – you can't expect me to remember the details of every single one). This was not an unusual event in and of itself, but there was one thing in particular that stood out about the writing of this article – I was completely dry in the hyperbole department. That *was* unusual. There is really nothing better than a massively outrageous, phenomenal, incredible, astonishing, unbelievable, astounding, mind-boggling and staggering amount of superfluous adjectives. From time to time. This time, however, I had nothing. Sentences ended up short. They said what they had to say. Then they ended.

I was at a bit of a loss as to explain this sudden drought of hyperbole, at least until Computex rolled around, and then it all became clear. You see, there must be some kind of universal limit on the amount of hyperbole that can be generated at any one time. In fact, I think there is something in a Stephen Hawking book about it – you know, somewhere towards the back.

At the exact time that I was working on said tech article, the marketing people over at NVIDIA must have been putting together the spiel on the new highly integrated nForce chipset. During this process, they managed to suck the universe dry of hyperbole. They didn't do it through sheer volume, though they came up with quite a few pearls. It was simply in terms of sheer 'over-the-topness' (which I understand is not a great hyperbolic term in itself, and I can only explain my use of it by saying that someone, somewhere just came up with a beauty, and I am left with the hyphenated dregs).

Let me give you a few examples of the NVIDIA magic. The nForce is made up of two primary components: the Integrated Graphics Processor (IGP) and the Media and Communications Processor (MCP). Now, these two terms are not too bad – in fact, they actually make some semblance of sense. But wait, there's more. To begin, the IGP is slated to 'redefine system and graphics performance', and the MCP will apparently 'redefine the audio and communications experience', while the individual components have even more in store for you. The IGP features some beauties: the TwinBank Memory Architecture (notice the fusion of two previously unrelated and unacquainted words into one plus the strategic – some would say pivotal – usage of capitalisation), which is essentially a 128-bit DDR memory bus; Dynamic Adaptive Speculative Processor (right . . .), which apparently boosts CPU performance by off-loading some tasks onto the chipset processor; and it incorporates AMD's HyperTransport (because just plain FastTransport just doesn't have the kick) as its I/O bus.

Then comes the bits that make up the MCP: the integrated Audio Processing Unit (APU), (meh – NVIDIA's one lapse in all of this), which delivers 3D positional audio and supports Dolby 5.1; StreamThru (awesome – another strategic use of capitalisation, and backed up by a deliberately misspelt word), which itself is an isochronous (yeah . . .) data transport system that improves data streaming; and controllers for Ethernet, USB and dialup (read 'modem') communications.

So what does all this mean to the rest of us? Basically, once you have cut through all the hyperbole (or 'guff' – you decide), the nForce should redefine the term 'integrated chipset' in a dynamic and exciting way. I will have to wait until I have seen one in action before I cast my final judgement, though spirits around the Labs are high. Unlike previous integrated chipsets, of which the i815 is the latest mainstream offering, the nForce is actually based around some pretty serious technology, with the power of the GeForce2 GTS graphics core. It is also a retake on the old Northbridge/Southbridge configuration. Unlike the i815, and other integrated chipsets, the nForce has the potential to deliver a decent amount of sound and graphics performance by bundling in powerful processors with an architecture specifically designed to have them all work closely in unison with the system CPU. It might not be comparable to having individual dedicated cards with your graphics, sound and networking; however, it will certainly be cheaper than buying them all individually. For those who cannot afford to spend a grand every few months on a new graphics card, or a few hundred on a sound card, the nForce may finally offer a viable solution.

And, you will be glad to know, my hyperbole is slowly returning. Wicked.

Macs Pain

Only Dan Rutter could love a broken Window more than a crusty Macintosh

Macintoshes annoy me, but not for the usual reasons. Macs don't annoy me because they're expensive. There ain't no law against 25% margins. Apple can charge whatever it wants for its products. Macs don't annoy me because they stop you from doing things that Apple thinks are more trouble than they're worth. Yes, Mac OS hides the system's giblets from the hapless user. But, importantly, it also doesn't require Joe Average to fool with said innards.

Windows often hides technical things that you need to be able to access to make something work. Hands up everybody who enjoys using Regedit? And Windows also forces you to deal with other technical things that you shouldn't need to know about. If I had a penny for every time Windows asked me where to find a file needed for a program installation, when that file was in the same directory as the installer I just double-clicked

Well, actually, if I had a penny for every time that happened, I'd only have a few bucks. But you get the idea.

Macs don't annoy me because of their patriots, either. Yes, there are Mac fanatics who believe Steve Jobs when he says a G4 Cube is perspex tissue over a supercomputer endoskeleton. But they're heavily outnumbered by the wiggy wiggy werd up Purple Shiney Pants PC tweakers who buy 15,000rpm SCSI drives for Windows Millennium Edition boxes.

They're all dumb.

But it's not the fault of the platform if idiots love it.

Macs also don't annoy me because they come with expensive unpopular technology included as standard. Apple has always done that, and it's a great thing. There's a long list of things for which all computer users would have been waiting longer were it not for Apple. It starts with the floppy drive.

No, what irks me about Macs is incompatibility. Expansion card incompatibility, in particular. A PCI expansion card for one system should be able to be used in any other system with PCI slots. The same goes for AGP. That was the whole idea of the standard – compatibility.

But it doesn't quite work that way. You see, x86-compatible PCs are 'little-endian'. Multi-bit numbers are stored with the least significant bit first. Macs work the other way around – they're 'big-endian'. And no graphics card will work in a Mac unless it supports both the Mac's unusual way of handling colour, and both data formats. It has to be 'bi-endian'.

What this means is that you can't just drop any current PC graphics card into a Mac and expect it to work. If a PC card – a 3dfx Voodoo3 or 4, say – can be made to support the Mac way of doing things, the way you make it happen is by flashing the card's BIOS. Which is an arcane ritual that may not actually be possible on the Mac, but has to be done on a PC.

But don't worry – most graphics cards can't be made Mac compatible at all. Not the original GeForce; not any GeForce2 except the MX. Not a PC Radeon card, despite the availability of Mac Radeons. Oh, and as for the STMicroelectronics Kyro II, arguably the best-value video chipset on the market today – fuhggedaboutit.

So if you're an enthusiast with multiple computers who's willing to settle for an off-the-pace graphics chipset, you can save a few bucks, at the expense of considerable time and aggravation, by converting a PC graphics card into a Mac one. But if you want, say, a GeForce3 – well, that's a shame. Go buy one from Apple for $1,200.

For your big fat slab of extra money – there's that 25% margin, folks – the special Apple card gives you two monitor outputs. There's one of those nifty Apple Display Connector ports that gives you video, power and USB in one cable, and there's a normal VGA output as well. So that's something.

But it's a bit of a shame that Apple don't sell any CRT monitors anymore. The only non-LCD monitor Apple sells nowadays is the one that's built into the iMac. This is a fine example of that 'making people use the new expensive technology' policy, but it means that new Mac buyers on some sort of budget are likely to opt for a normal, cheap PC monitor to go with their Mac, which means they'll use the VGA output connector. So they might as well have a PC card anyway – if it worked.

The Mac hardware differences that make it impossible to do what AGP and PCI were supposed to do are there for a reason, and they're not a trivial thing to change. But that doesn't mean they're not darn annoying for hardware junkies.

The bottom line, which won't surprise any of you, is simply that if you want real power you can mess with on the cheap, you still want a PC.

Discography: DVD-R and DVD-RAM

David Petersen takes us through basic training for the next generation of DVD.

ⓘ The Philips DVDR-1000 is the first consumer DVD-RW video player in Australia. PC versions will follow shortly.

The new generation of compact disk storage is the digital versatile disk read only memory (DVD-ROM) and has varying storage capacity up to 17GB for double-sided, double-layered disks.

DVD-ROM disks have seven times the storage capacity of a CD-ROM, and with double-layered and double-sided versions can have 26 times the storage capacity. Movie DVD technology is rapidly replacing the older VHS movie format as the preferred media for watching movies, but is limited by its inability to record information for the average consumer.

Digital versatile disk random access memory (DVD-RAM) can store 4.7GB of information and can be written to many times using a DVD-RAM drive. The specifications for this media were released in 1998 and can store any type of information such as text, audio and video. Until recently is has been the only DVD media that can be written to.

A new technology that is starting to emerge will revolutionise the compact disk media and is simply called DVD-R. There are more similarities than differences between DVD-R and DVD-RAM, so pay attention 'cause it gets a little confusing.

DVD-RAM is an adaptation of DVD-ROM and uses the same magneto-optical technology to record data to CD-ROM. Single-sided DVD-RAM can store 2.6GB of information and can be read by most DVD-ROM drives. Double-sided DVD-RAM can store 4.7GB of information but cannot be read by most DVD-ROM drives. On the flip side DVD-RAM drives can read DVD-ROM, CD-RW and audio CDs.

DVD-R is a write once, read many (WORM)-type disk and can store 4.7GB of information. It can be played on any DVD playback device, which is the big advantage DVD-R has over DVD-RAM.

The data transfer rate of 1x DVD is roughly equivalent to that of an 8x CD-ROM, but the revolutions per minute is slightly less than a 1x CD-ROM. This is due to the nature of the compressed data using a larger number of smaller data pits and a smaller track pitch, or distance between tracks. The large data storage and better transfer rate at slower speeds makes DVD-ROM ideal for streaming video.

As with most forms of technology it always comes down to consumer's needs versus price. A DVD-RAM drive will cost around the $1,500 mark, while for a DVD-RW drive with authoring software you can expect to pay close to $10,000 (no, there isn't an extra zero in there). The only DVD-RW drive that we know of is the Pioneer DVR-A03 and comes with authoring and writing software plus two DVD-R disks. DVD-R drives are standard in the Apple Mac 733MHz iDVD G4 systems and come with authoring software. At the moment, each blank disk costs about $30 and stores one hour of DVD-quality video. So there goes any idea of creating your own DVD movie piracy shop!

The price should start to fall with time if the media starts to catch on. Remember, the cost of CD-R disks were around the same price when they first hit the shelves back in the late '90s.

Looking to the future and to confuse things even more is a new format known as HD-ROM (high-density read only memory), developed by IBM and Norsam Technologies. The HD-ROM uses a high-powered particle beam laser and has a storage capacity of 165GB per disk. Used mainly for archiving large databases it can write to more permanent media such as metal, making it virtually indestructible.

On the general consumer front the DVD-R technology will more widely available with DVD recorder devices that work just like your VCR and will be known as Digital Multimedia Recorders (DMR). Other devices will use a hard drive and will be known as personal video recorders (PVR). In issue 5 of atomic, we reviewed the tasty Hitachi DZ-MV100A with built-in DVD-RAM. Pioneer, Philips and Panasonic are planning to launch these devices in September/October this year. ▢

DVD-ROM vs. CD-ROM

Optical media drive speed	Max. transfer rate	RPMs
1x CD-ROM	150Kb/s	200-530
2x CD-ROM	300Kb/s	400-1,060
4x CD-ROM	600Kb/s	800-2,120
8x-12x CD-ROM	1.2Mb/s	1,600-4,240
24x-50x CD-ROM	1.8-6Mb/s	2,400-6,360
1x DVD-ROM	1.25Mb/s	Approx 200

DVD types

DVD version	Media type	Capacity
DVD-5	Single-sided, single-layered	4.7GB
DVD-9	Single-sided, double-layered	8.5GB
DVD-10	Double-sided, single-layered	9.4GB
DVD-18	Double-sided, double-layered	17GB

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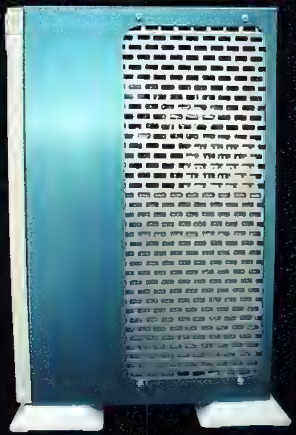
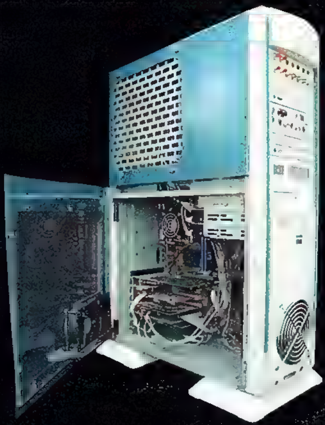




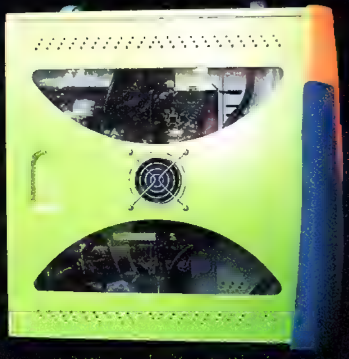
Technical details

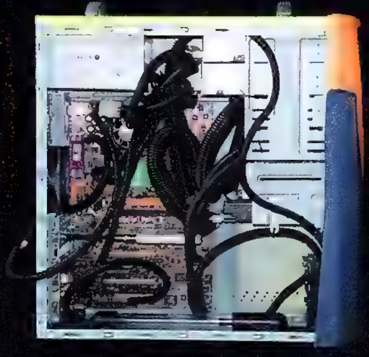
- AMD Thunderbird 1.2@1.4GHz with GlobalWin WBK38
- ASUS AV7133 motherboard
- Kingmax PC150 384MB
- IBM 30GB and 40GB 7,500rpm
- SoundBlaster Live! 5.1 with Live!Drive IR
- Voodoo3 2000
- Creative DVD decoder card
- Rounded cables
- Key start for LANs
- Baybus with five ultra-bright LEDs
- One PAPST 120mm intake

The story

Starting out as stock AT full server tower, it was just another beige tombstone down at the local LAN. The first modification was the perspex window with two 80mm intakes attached, which where run through a four-way fan bus. The now stock-standard neon light was added in the form of two blue sound-modulated neons. Also, the top baybus was altered to house five DPDT switches with corresponding ultra-bright LEDs and four push buttons to control the automatic cooling system, using Dallas 1620s. Both right and left sides were cut out and a grills screwed into place for passive ambient room cooling and superior airflow. The case was still easily confused with the other beige eyesores, so it was sanded back to allow for an undercoat. Then a brilliant coat of metallic blue paint was applied, because, as we all know, blue is faster than red. The finishing touch, for added LAN security, was a key start switch, to keep l33t h4x0rs and the like on their toes.

Moses prefers a friendlier beast





Technical details

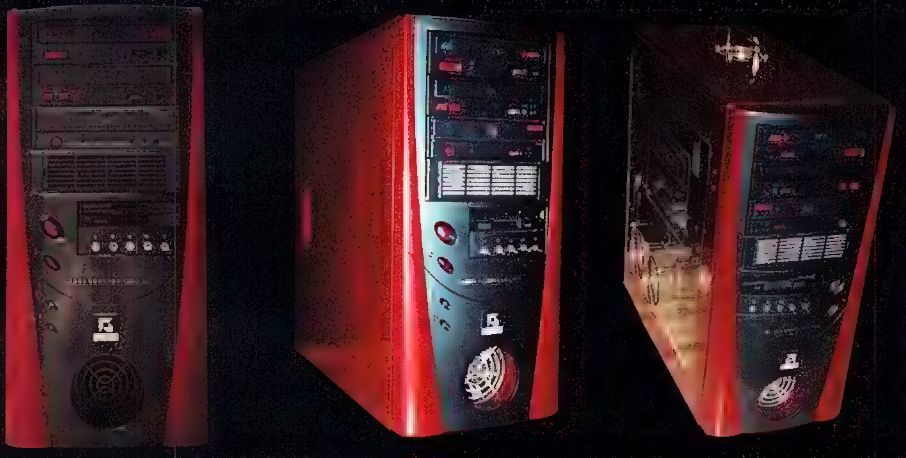
- Pentium III 800@950MHz
- 30GB IBM hard disk drive
- Intel 815 integrated graphics
- ASUS CUSL2
- SoundBlaster Live!
- 16x Pioneer DVD
- Sony CD-RW 8x/4x/20x
- ASUS iPanel
- Five additional case fans
- Two glass inserts
- Black conduit
- Red neon
- Alloy handles
- 2-Pak paint job in Green Pearl

The story

Once I had the base case that I wanted to build onto, I spent the following weekend hard at it, cutting the holes out of the side with the jigsaw from work. The hardest part was to make sure that I'd cut it nice and straight. I didn't want any plastic extrusion – it had to be clean lines. I decided to use glass for the window instead of perspex, in order to get the best reflection. I bit the bullet and decided to use 2-pak pearl paint, which was more expensive than I thought it would be, but was worth every cent. I took the case apart completely and took it to work so I could spray it in the spray booth – 10 coats in all, and it glows like a stick of plutonium. I stuck in a neon for the night glow and added some alloy handles, which are reinforced with steel plates to take the weight off the box. Completed with 'schmik' chrome fan grills to either side of the case, and fitted it with five fans in total to keep it all as cool as it looks. An ASUS iPanel and a custom-made Sony sticker completes it.

The best atomic readers' custom cases. Each hot box scores their owner a six-month subscription to atomic.

Dragan Jurisic keeps seeing red



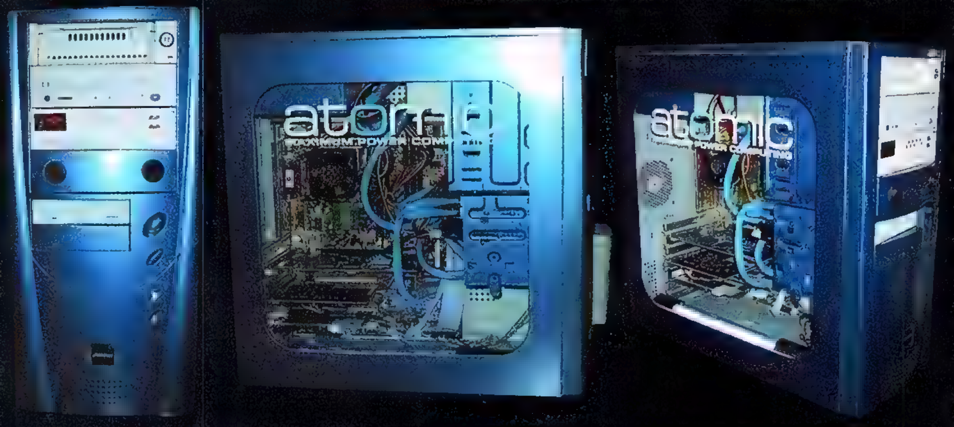
Technical details

- Athlon 1.33@1.55GHz
- ASUS A7V133 motherboard
- IBM 30GB hard disk drive
- Leadtek GeForce2 GTS
- SoundBlaster Live! Digital
- Creative 52x CD-ROM
- ASUS 10x DVD-ROM
- Ricoh CD-RW 4x/6x/32x
- Hedgehog Copper Heatsink
- 80mm front and rear fans
- Two 80mm side fans
- Two neon lights
- Custom fan bus
- Red, rounded IDE cables

The story

I was a little unimpressed with the boring beige box in my computer room and thought it would be nice to cheer things up. I took my case apart, went straight to the local hardware store and went on a shopping spree for auto paint and power tools. I marked up each panel that I wanted a fan in and then cut the holes using a jigsaw. I wanted to include some perspex, so I made a square cut in the side panel. After making the appropriate hole in the front bezel, I matched up some PVC piping and glued it together to make the fan duct. When the holes were all done, I primed and painted the metal panels with three coats of Cardinal Red paint, and three coats of Gunmetal to the frame and front bezel. The PSU was also painted Cardinal Red. The perspex was cut to shape, and then I used a router to edge it off so that it fit flush with the side panel. I then fitted and painted the perspex. I used a piano hinge to fix it to the case frame for easy access to the inside. I also fit a brass handle on top to make it easier to carry.

Dinosaur's got the blues



Technical details

- AMD Thunderbird 1.33GHz
- ASUS A7A266 motherboard
- PC2100 DDR SDRAM 256MB
- IBM Deskstar 13.5GB hard disk drive
- Hercules 3D Prophet GeForce2 GTS 64MB
- SoundBlaster Live!
- Altec-Lansing ADA-880
- Nortel cable modem
- Hewlett-Packard 9100i CD-R/RW
- Iomega Zip Drive 100MB
- ASUS iPanel
- Thermaltake Volcano fan

The story

I had a Pentium III 667MHz but wanted a faster and better system. While I could have replaced it with a Pentium 4, the cost of the CPU made me look at the AMD Athlon as an alternative. Originally I had PC133 SDRAM, but I changed the motherboard to an A7A266 so that I could use DDR SDRAM (for the boost in performance that it offered) and the Asus iPanel. With the help of my son, Rob, who is technically more adept than I am (and who also organised the atomic logo on the window), I put together a system which could be expanded in the future. In time I hope to get a GeForce3 graphics card to complete the picture, experiment more with overclocking and add fans to control internal temperature and satisfy monitor cooling requirements. We have only overclocked the CPU to 1.4GHz so far, but hope to end up with a system that is both high performance and state-of-the-art. With more overclocking, performance tweaking and a GeForce3 video card, I should end up with a pretty good computer.

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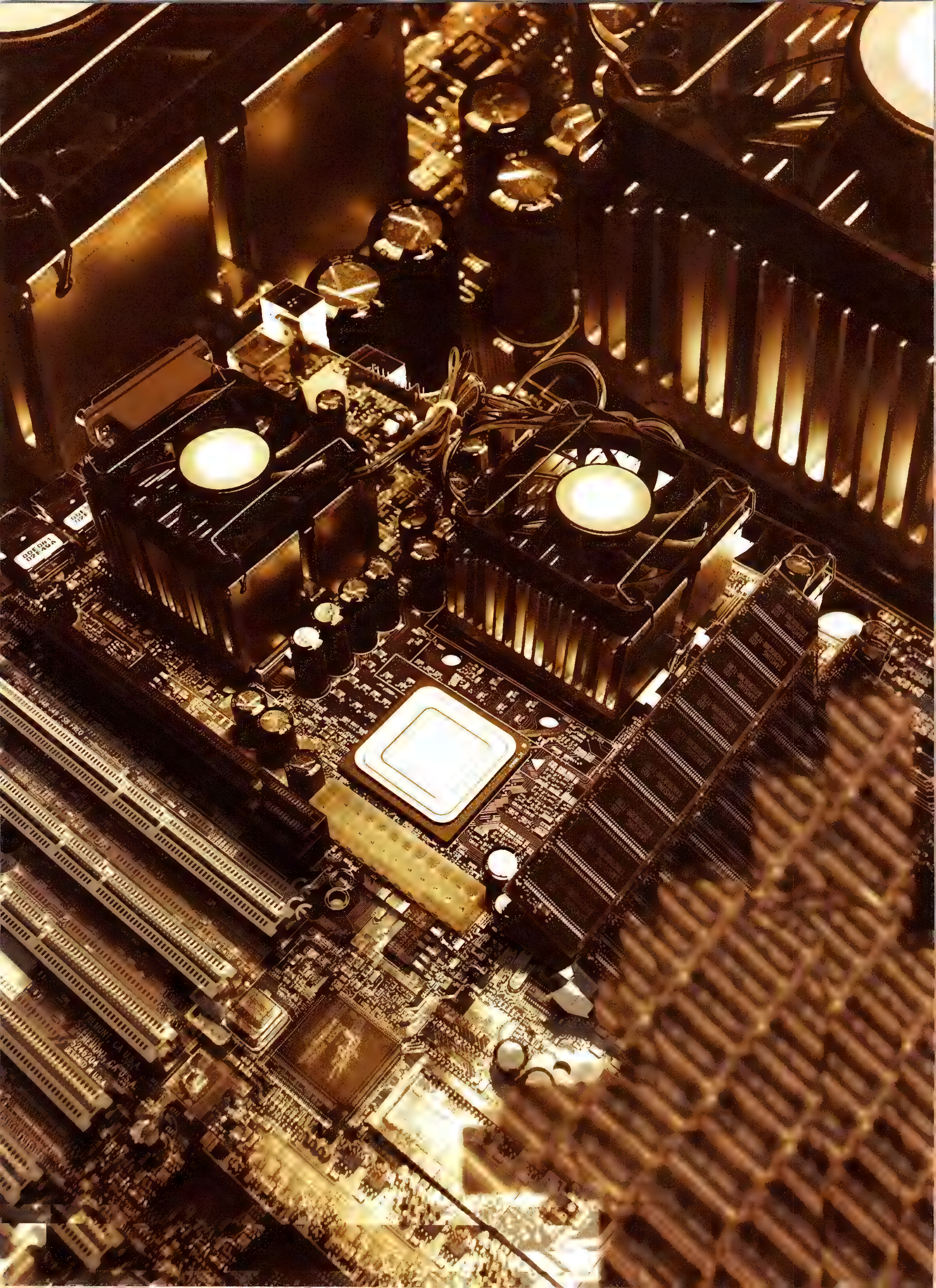

Palomino: What's new, what's better

Dan Rutter dons his lab coat, calibrates his calipers, tucks in his tie and dissects the new AMD Palomino core.

Bigger core

So what is the difference between a Thunderbird and a Palomino? We're glad you asked. The old Thunderbird Athlon core has 37 million transistors and an area of 120mm^2. The new Palomino Athlon core has 37.5 million transistors and an area of 128mm^2.

The Palomino core may not have many new transistors, but it's a noticeably different shape from the Thunderbird. The contact patch that sticks out of the top of the processor package is somewhat bigger, and closer to square. The new shape is the result of a rearrangement to improve performance and reduce power consumption.

The Palomino core is made using the same 0.18-micron process as the Thunderbird. That means that the smallest lines etched onto its silicon surface are 180 billionths of a metre in width. The first Athlons used a 0.25-micron process, but AMD dropped to 0.18 before the introduction of the Thunderbird.

The Palomino has a physically larger contact patch to its cooler, which should help it get rid of heat, as well as reducing the pressure per unit area on the top of the chip. Many Socket A CPUs have been damaged by users who attach the wrong kind of CPU cooler, or who are just a bit clumsy. More top area should make the Palomino more resistant to this kind of abuse.

Lower power

AMD claims that the Palomino core uses up to 20% less power than a Thunderbird at the same clock speed. These may sound like weasel words ('up to 20%' includes 0%), but the new Athlon genuinely does suck significantly less juice than the old Athlon Thunderbird. This is an obvious advantage for mobile applications, where every minute of battery life counts. But it also helps mains-powered computers, because less power consumed means less heat emitted. This is especially good given that the Thunderbird is not a cool chip, especially at higher speeds.

A Thunderbird Athlon running at 1.2GHz from 1.75V can emit more than 63W of heat when it's at full utilisation. Overclocked processors running from elevated supply voltages – in order to raise the core speed limit – can get a lot hotter. A Thunderbird at 1.5GHz and 1.85V, for example, can be an 85W heat source.

In comparison, a 1GHz Pentium III Coppermine running from 1.75V emits less than 30W of heat at worst. That means it needs a much less impressive CPU cooler, and less case airflow. The 85W 1.5GHz Athlon is maybe 75% faster, but it's pumping out almost three times as much heat.

The Palomino's rearranged core requires a lower supply voltage in order to hit a given speed. That accounts for a big slice of the power saving. The 1GHz Thunderbird's standard voltage is 1.75V; the Palomino only needs 1.4V to manage that speed.

If the CPU is lightly loaded then the power saving can be considerably greater, because of the PowerNow! power-saving features that let the Palomino 'throttle' its speed, and supply voltage, according to the job it's doing.

PowerNow! supports up to 32 speed and voltage steps, between a frugal 500MHz/1.2V baseline and the Palomino's 'sticker speed'. In reality, only a few step levels are likely to be used, and PowerNow! will only work on motherboards that support it. Few desktop motherboards that support PowerNow! exist yet, and I wouldn't hold my breath waiting for more if I were you.

This isn't a big deal, though. Speed throttling is a standard feature for current mobile processors, but it's not very useful for desktop ones. If your mainboard does support PowerNow!, however, all you need to enable it is a simple driver. The driver normally sets the processor speed according to the current CPU utilisation, but it also lets the user lock the processor to its maximum speed, or to its minimum speed.

If you've got a motherboard with hardware monitoring capabilities, the Palomino also has an integrated thermal sensor that should give you a pretty accurate idea of the real CPU core temperature. Intel CPUs have had these sensors for some time, but the Palomino is the first AMD chip to feature one. AMD motherboards with CPU temperature sensors have, up until now, just used an external probe behind the CPU socket or stuck onto some hopefully representative bit of the processor. Pre-Palomino Socket A boards probably won't be able to monitor the new sensor, however.

TLB tweaks

The Palomino's Translation Lookaside Buffers (TLB) have also been improved. The TLB is a specialised kind of cache that holds translated addresses, which the CPU uses to get data into and out of main memory. The TLB saves a processor from having to translate external memory addresses to the different format it uses internally every time it needs to access main memory. This can greatly improve memory performance.

Previous Athlons only have 32 entries in the level-1 (L1) Data TLB; the Palomino has 40. It also has an 'exclusive architecture' for the level-2 (L2) Data and L2 Instruction TLBs, to stop L1 TLB entries being duplicated in the L2 buffers. And there's also 'speculative reload' for TLB entries, allowing entries the processor seems likely to need next cycle to be loaded before they're requested. This eliminates the load time penalty, if the guess turns out to be right.

These TLB changes can make a significant difference in applications that work main memory hard, such as the kind of serious server and scientific computation tasks that benefit from very fast memory access more than they do from very fast CPU speed. For desktop computer tasks (including games), the TLB tweaks have less of an impact.

Cache changes

The Palomino's 128KB L1 and 256KB L2 cache sizes and arrangement are the same as the Thunderbird, but now there's an automatic data prefetch system. This is another 'speculative' sort of technology – it looks at what memory has just been accessed, and preloads the cache memory with data from memory locations that are therefore likely to be

≥

accessed next. The Intel Pentium 4 can do the same sort of thing.

Prefetch can deliver a performance increase if you've got enough RAM bandwidth to support it. It's an extra load on the memory, since the prefetched data isn't actually always needed, or used before something else has to be loaded into the limited cache space. This means that you need fast memory to support it. The Palomino ought therefore to benefit from DDR RAM more than the Thunderbird does.

However, given the low memory bandwidth requirements of many desktop tasks, this is something that's of more interest to server, workstation and specialised computing users than to average consumers.

VeryLongName technology!

The Palomino supports the full set of Streaming Single Instruction Multiple Data Extensions. This longwinded name collapses via a double-acronymisation process into Streaming SIMD Extensions, and then into plain old SSE.

SSE is an extended x86 instruction set that debuted with the Pentium III. The Pentium 4 has a more extensive SSE2 version. SSE doesn't do anything unless software supports it; if software does support it, SSE lets the processor far more efficiently apply the same floating point operations to a sequence of input values.

This is exactly the sort of thing that often has to be done in, for instance, 3D graphics applications. That's why the marketing people start raving about 'advanced multimedia capabilities' whenever they talk about SSE or SSE2, or AMD's own 3DNow! instruction set (which the Palomino also supports), or even Intel's original MMX.

None of these innovations have actually ended up making a huge difference to desktop users, though. Many tasks they would help with are now performed by hardware-accelerated graphics and sound cards, and software that could benefit from the extended instructions often doesn't actually use them.

But if SSE matters for your application, the Palomino can do it now.

Compatibility

You can't use a Mobile Athlon 4 in anything but a laptop, because (like other mobile chips) it comes in its own special physical package that can't be used on a normal motherboard. The other Palomino-core Athlons, though, will come in the standard Socket A package and should work as drop-in replacements for existing Socket A CPUs. All a Socket A motherboard ought to need to work with a Palomino is BIOS support for the new chip, so it knows what it's looking at, and the ability to deliver the voltage the chip wants. Most current Socket A boards have CPU voltage regulators that are easily able to handle the unusually low voltage required by lower spec Palominos.

Palominos in existing systems should, therefore, display the same three levels of (in)compatibility that result from every minor CPU tweak. Some boards will work fine, ID the processor properly, and run it at its proper speed and voltage automatically. That's the first compatibility level – plug in, turn on, rejoice.

Many motherboards will need a BIOS update to work that well. Those that don't have an update available may fall into the second compatibility level, where the CPU is misidentified and may run at the wrong speed or voltage. That's a problem you can usually fix with manual settings while you wait for an updated BIOS. It doesn't matter if the motherboard displays a nonsense CPU ID on startup, as long as the thing works.

Level three is for motherboards that don't want to know about the new processor at all, and won't start up if you try to use it. This can also happen with boards that don't let you manually adjust CPU settings, and which mistakenly try to run the new CPU faster than its core can handle.If you've got one of these motherboards, all you can do is wait for a BIOS update.

Palomino chips should work on many older motherboards, and older Athlons and Durons should work on newer boards, too – even multiprocessor boards. AMD has always advertised the Athlon as being multiprocessor capable, but it's taken this long for multiprocessor motherboards to arrive. Now that we have, you can use any of the Socket A CPU flavours on it. AMD does not officially support anything but Athlon MPs for multiprocessor applications, though.

Performance

The Thunderbird was faster than previous Athlon models, but not by a great deal. At a given clock speed, there was practically no real-world test that would show a Thunderbird-powered system more than about 5% faster than one with an older Athlon. For single-processor tasks, the Palomino shows a similarly underwhelming advantage.

The new data prefetch feature helps, with fast RAM, and can pull the new CPU about 10% ahead for some tests. Intensive business software benchmarks – video editing and pro 3D graphics, for instance – get a boost from prefetch as well. But no desktop tests show a really thrilling gain compared with the Thunderbird, and many other tests show a smaller advantage.

In dual-CPU applications, the Palomino's performance enhancements can give it a more impressive gain. For heavy-duty database work, for example, dual Palominos can score more than 25% better than a pair of identically clocked Thunderbirds, with both systems using PC2100 DDR RAM.

For other common tasks done by dual-CPU workstations, though – Photoshop, CAD/CAM, software development and 3D rendering, for instance – the Palomino once again only barely edges out the Thunderbird. For this sort of work, it's better to have a couple of 1.4GHz Thunderbirds than a couple of 1.2GHz Palominos.

So if you've already got a high-spec Thunderbird Athlon, there's not much point buying a Palomino Athlon to replace it. If you're a keen overclocker and your tweaky motherboard of choice works okay with a Palomino, then the new, cooler, lower voltage chip will obviously appeal to you. But if you're not interested in wringing every last drop out of your processor, then there's no reason to rush to upgrade.

The Palomino's got more core speed potential than the Thunderbird, though. Soon enough, every Athlon (and Duron) will use the Palomino core, and they'll be available with sticker speeds considerably higher than the Thunderbird chips can manage.

At the time of writing, the 1.2GHz Palomino-core Athlon MP is selling for a little more than the 1.4GHz Thunderbird. If you're an early-adopting overclocker or interested in high RAM load multiprocessor applications, that pricey Palomino is a good deal. Anybody else can buy a 1.2GHz Thunderbird Athlon and about 512MB of PC133 memory for the price of the 1.2GHz Palomino.

So the Palomino's a remarkable example of a not-too-expensive CPU that works well in a wide variety of applications, and can in fact match or beat Intel's more expensive high-spec Pentium 4 systems for numerous tasks. But it's not enough of a leap forward from the previous Athlon model for current AMD CPU owners to get tremendously excited.

It's an evolution, not a revolution. ▢

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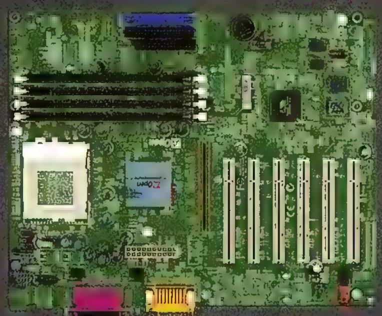

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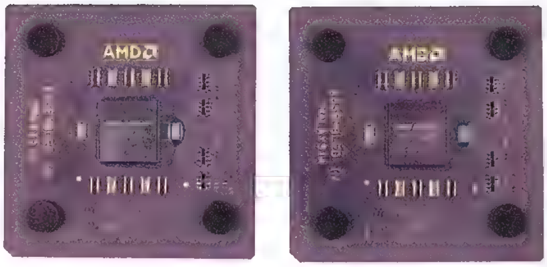
The battle of the heavyweights

This month's Head to Head sees the dual-CPU power of Intel's new Xeon facing off against AMD's debut into SMP, the Athlon MP. Bennett Ring had the pleasure of putting both of these behemoths through their paces.



The new AthlonMP CPU from AMD.

Intel and AMD just love to lock horns, don't they? Within the last month both of these companies have released new workstation CPUs and supporting SMP (symmetric multiprocessing) chipsets. Considering the years of development time behind both of these products, it's amazing that Intel and AMD have still managed to release them at practically the same time. It just goes to show how competition stimulates the market, leaving us with even more good stuff to tinker with.

It was obvious that we needed to compare these two new workstation brutes, even though they are both rated at vastly different speeds. The fastest is the Xeon at 1.7GHz, while the Athlon MP is currently peaking at a much lower 1.2GHz. We decided to focus on workstation performance, and hence used a different set of benchmarks than our usual suite. First up was a dose of Photoshop 6.0 for all the desktop publishers and image editors out there, followed by a dash of Lightwave 6.5 for those into 3D rendering, before a main meal of atomic Applications Benchmark goodness to check performance in older 2D applications. We finally washed it all down with some Quake 3: Arena, just to prove that these systems really aren't meant for gaming. And for once, the results weren't as clear-cut as we are accustomed to.

Our Xeon system was kindly provided by Xenon.

In the left corner we have Intel's 1.7GHz Xeon system. Our dual-CPU Xeon CPUs were housed on the i860-based Tyan Thunder S2603 motherboard, which, at about $2,500, is a rather pricey motherboard. Add to this the cost of the two 1.7GHz Xeon CPUs at $1,300 each, and we soon see that the world of the workstation is only for those with seriously large wads of cash.

Intel's latest Xeon CPU is based around the Pentium 4 architecture, and as such features all of the funky sounding features of the Pentium 4. You've got your NetBurst architecture, 400MHz frontside bus, SSE2 (Streaming SIMD Extensions 2) support, Level 1 Execution Trace Cache, Rapid Execution Engine, 256KB Level 2 Advanced Transfer Cache and who could forget the good, old Advanced Dynamic Execution Engine. But really, all these terms and technologies are meaningless at the end of the day, because all we really care about is how fast can it get the job done.

A CPU is useless without a chipset to run alongside, and the Xeon processors are designed to run hand in hand with Intel's 860 chipset. This chipset is Intel's newest multiprocessor chipset, and inherits the RDRAM legacy that all Pentium 4 systems are currently encumbered with. Most workstations use around 1GB of RAM at the least, so installing 1GB of RDRAM, which is currently about $350 for 128MB, will end up costing you at least $2,700. Ouch.

And in the right corner we have AMD's long-awaited multiprocessor solution, the Athlon MP platform. This is AMD's first-ever multiprocessor product to be released. It's common knowledge that AMD's Athlon processors have always been SMP compatible, but there was never a dual-CPU chipset to run them in. Finally, after two years of development to ensure the chipset is rock solid in terms of stability, AMD has released its 760 MP chipset.

The Athlon MP CPU, as far as we can tell until the desktop version is released, is for all intents and purposes identical in architecture to the other Palomino-based Athlons. We're not sure if the desktop Palomino will have the SMP features enabled, but the chances are pretty good going by the few tidbits of information floating around at the moment. Surprisingly, the Athlon MP's current top clock speed is 1.2GHz – a whopping 500MHz slower than the top-of-the-line Xeon. But as we've seen with the Athlon versus Pentium 4 debate in the past, clock speed is becoming increasingly irrelevant when it comes to system performance. At about $700 each for the 1.2GHz Athlon MP CPUs, they come in at half the price of the Xeon 1.7GHz. With prices these low, I wouldn't be surprised if AMD stood for 'Aren't Making Dollars'.

The Athlon MP platform revolves around AMD's own 760 MP chipset. Until now AMD has maintained the stance of only making chipsets to help establish its CPUs, but this is set to change with the 760MP. We used the 760MP-based Tyan K7 Thunder motherboard, which took out the highly respected 'Best of Computex 2001' award. At about $1,700, these boards are two thirds of the cost of the Tyan Xeon motherboard. The 760MP chipset is DDR-RAM only, so for 1GB of RAM it will cost you roughly $750 – much less than the $2,700 it will cost you for 1GB of RDRAM in the Xeon system.

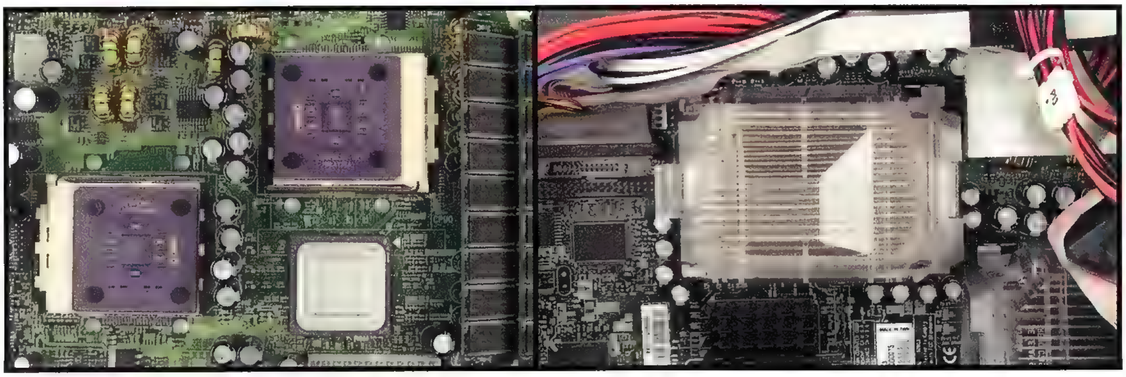
FAR LEFT The Xeon system with guts exposed. CENTRE The 760 MP Northbridge bears a striking resemblance to the AMD K6-II CPU. TOP: Our Tyan K7 motherboard minus the CPUs.

We installed our reference GeForce2s into both systems before removing some RAM to bring both back down to 512MB. Windows 2000 with Service Pack 2, DirectX 8.0 and the Windows 2000 Detonator 12.41 drivers were also installed. Due to incompatibility with our reference SCSI PCI card, we used the integrated SCSI controllers within both motherboards, as well as the SCSI drives they were supplied with; a Quantum Atlas 10K in the Athlon MP and a Seagate X15 Cheetah in the Xeon. Then it was time to let the benchmarking commence!

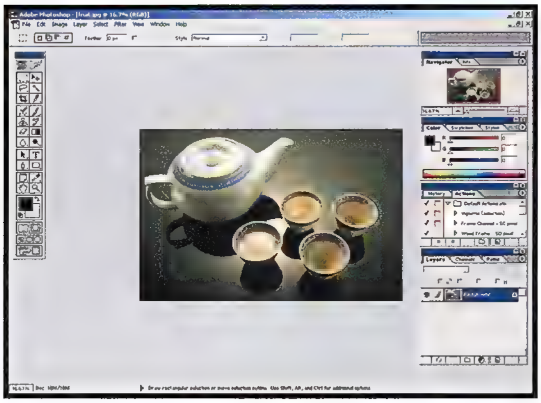
First off the benchmarking shelf was Lightwave 6.5. This professional 3D rendering package makes use of multithreading, which is necessary to utilise both CPUs. We used the included RayTrace benchmarking scene, which consists of several reflective balls floating in front of lots of mirrors. Using a stopwatch, we timed how long it took for each system to render the scene. The Xeon system rendered the scene in an impressive 162 seconds, which is fast by anyone's standards. But the Athlon MP system wasn't going to have any of that, posting an even quicker time of 152 seconds. This is around 7% faster than the Xeon, for a machine that is less than half the price! At this stage we started to think this Head to Head might go the same way our Athlon/DDR versus Pentium4/RDRAM Head to Head had gone – in AMD's favour.

Next up was Adobe's Photoshop 6.0.1, a very popular application that also uses multithreading. A plug-in for Pentium 4 and SSE2 optimisations was released for Photoshop recently, so we made sure this was installed on the Xeon system. We also benchmarked the AthlonMP system both with and without this plug-in, but it made no noticeable difference to this system. Our benchmark consisted of opening a 6MB JPEG file, resizing it to double the size, applying five or so different filters, resizing it again and then saving a copy. This was recorded as an action called Benchmark (similar in principle to a macro within Word or Excel), before being run and timed by the trusty stopwatch. The Athlon MP managed to finish these tasks in 210 seconds, but the Xeon blazed through it in a mere 161 seconds. That's a performance boost of around 33%. It should be noted that Photoshop has been optimised for the Pentium 4 and not for the Athlon, but it's obvious that if Photoshop is your application of choice, the Xeon is the faster system by a long shot.

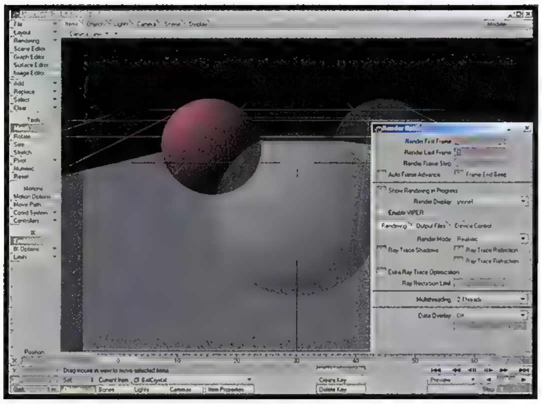
We then ran our atomic Applications Benchmark on both systems. This uses a combination of Adobe Photoshop 5.0, CorelDRAW 8.0, FileMaker Pro 4.1 and Microsoft Word, Access and Excel to generate



LEFT: Dual Athlon MPs in place. RIGHT: The bizarre heat shroud on the Xeon system.



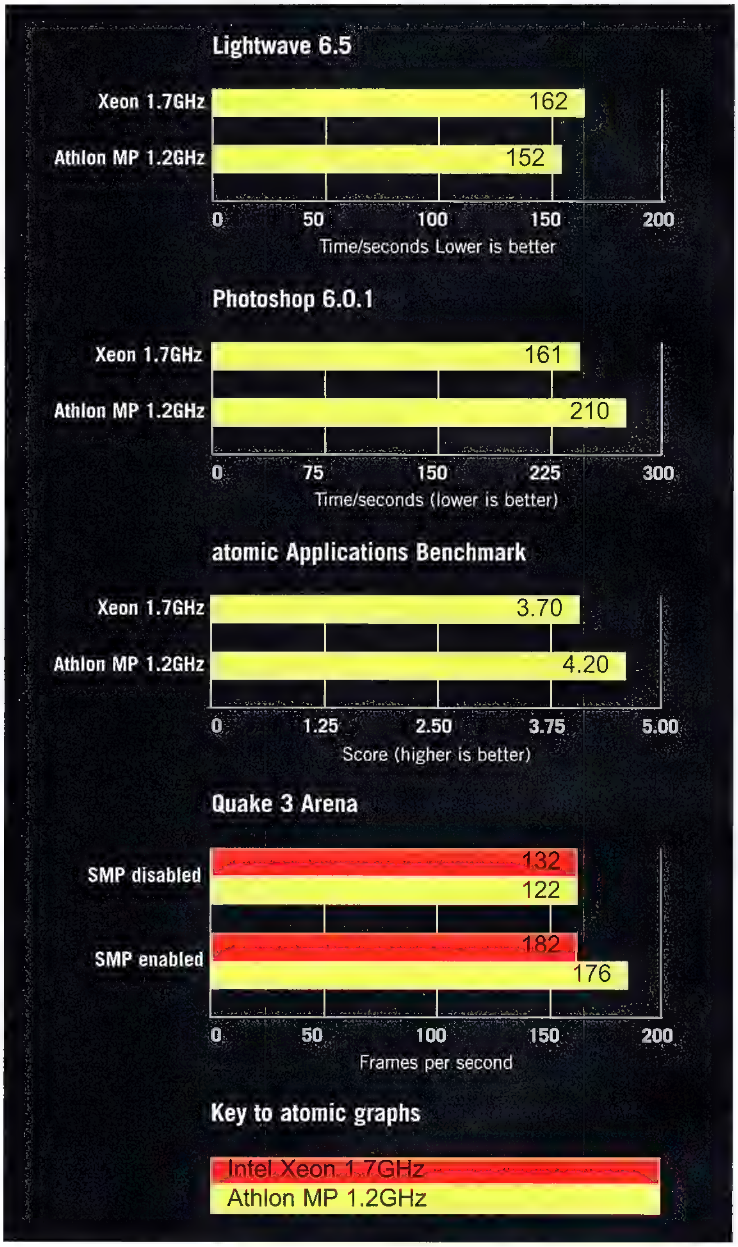
Our Photoshop benchmark does amazing things with teapots.



Three balls are better than two for benchmarking in Lightwave.

a single score. It must be noted that the only program out of all of these that supports SMP is Photoshop 5.0, and that none of the programs are Pentium 4 optimised. So is it any surprise that the Athlon MP system came out on top by about 15%? The Xeon scored an impressive 3.71, which is slightly slower than the Athlon MP's score of 4.20. So if you need to use older software that isn't optimised for the Pentium 4, the Athlon MP looks to be the way to go, even though the grunt supplied by dual CPUs isn't really necessary.

Finally, we put both of these systems through their Quake 3: Arena paces, as it's a good test of OpenGL and 3D rendering performance. It's also one of the only games available that supports SMP. We expected the Xeon system to come out on top again, as Q3A is one of the only benchmarks where the Pentium 4 excels over the Athlon, and usually by a fairly large margin. However, it seems that the full SSE compatibility introduced in the Palomino-cored Athlon MP has served to close the gap somewhat. We ran at 640 x 480 resolution, 16-bit colours and textures, no sound, lowest texture detail and highest geometry detail to allow us to see what the CPUs are capable of when they're not being held back by the system's video card. The Athlon MP system scored a whopping 176fps, but the Xeon system came out just ahead at 182fps. These are the fastest timedemo scores we have seen when using the atomic Q3A demo.



Considering the much cheaper price of the Athlon system, the performance difference was negligible.

We also disabled SMP support to see what difference it would make – surprisingly, it turned out to be substantial. Both dropped in frame rates by about 50%, with the Athlon MP scoring 122fps and the Xeon scoring 132fps. So if you can think of a game that supports SMP, requires amazingly fast CPUs and isn't limited by the video card, either of the two systems will give you amazing performance. It's just a pity that there isn't such a game in existence.

So who wins the fight? Both of them, actually. If you are using software that hasn't been specially optimised for the Pentium 4, then you can't go past the Athlon MP. It is far cheaper than the Xeon system, and generally performs faster. However, if you primarily use software that is optimised and proven to run better on the Pentium 4 architecture, such as Photoshop, the Xeon is the system you want. It won't be anywhere near as cheap as the Athlon, but the performance seems to be quite a bit faster. It will be interesting to see if many other popular productivity applications will also get the same performance increase when they finally receive the Pentium 4 treatment.

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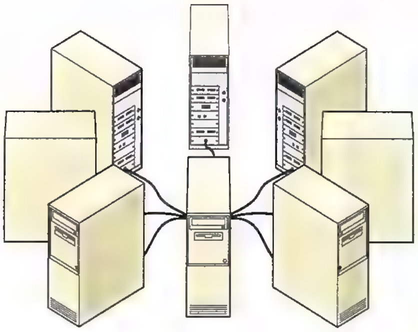
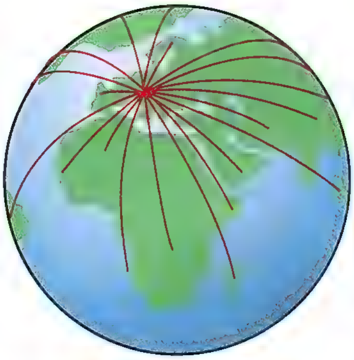
Distributed processing

Ashton Mills multiplies the power of one a few million times.

The design of supercomputers can vary greatly, but they generally contain thousands of central processing units that share memory and storage space. Janus, one of the biggest supercomputers in the world, consists of 9,216 Pentium Pro processors. Janus is used to simulate nuclear explosions and the effects a comet, should one impact the Earth.



A Beowulf cluster makes use of individual machines linked via a high-speed network to create a powerful parallel processing beast. Asgard, the biggest Beowulf cluster in Europe, consists of 251 Pentium III dual-processor nodes, providing 501 CPUs of parallel computing goodness. Asgard has been used to research the nature of particle physics and optimise experiments carried out on the International Space Station.



With distributed processing, nodes are connected via the Internet and can be any type of machine located anywhere in the world. Even though distributed.net isn't the largest project currently running, the total processing power of its members equals the equivalent of some 160,000 Pentium III processors.

Illustration Juanita Franzi

Distributed processing is perhaps the most logical outcome of the information revolution's two greatest technologies: the computer and the Internet. Unless you're fragging away in your favourite Quake clone, compiling a kernel under Linux or rendering high-quality images, your PC's central processing unit remains largely unburdened. Pair this with the Internet – a global, real-time, pervasive communications network that links said PCs, and you have the opportunity to create massive supercomputers that quite literally encompass the world.

Well, sort of. Supercomputers normally consist of hundreds or even thousands of CPUs linked together via a local bus, or in a slightly slower form, linked together via a high-speed LAN, aka a Beowulf cluster (see atomic, Issue Four, page 14 for a glimpse of one). Distributed computing is essentially the next logical step – CPUs linked over the Internet.

Types of processing

There's an important difference in how each of these systems operate. A one-thousand CPU beast operates in a similar manner to a multiprocessor PC – when jobs are executed, multiple threads are executed over multiple CPUs – true multitasking, aka symmetric multiprocessing. A Beowulf cluster is similar, but due to communicating over a standard network, the CPUs don't share memory space (but can share hard drive space over the network) and tasks are generally split up into equal-size chunks, with each chunk going to a node to be processed in parallel, hence the term parallel processing. Unlike a Beowulf cluster, machines in a distributed computing network connect only intermittently to send and receive their 'work units' and can be located anywhere in world instead of in just one building – hence the term 'distributed processing'.

This worldwide, massively distributed virtual computing network brings with it other problems that aren't a concern in a Beowulf cluster, however. These include managing the data from machines that complete their tasks at different speeds, monitoring data integrity of information and even taking into consideration factors such as cheating – data changed by those who own the client machines. To handle the latter some distributed computing projects send the same data chunks out to multiple machines and compare the results to ensure they are all the same. If there's an anomaly, the data chunk is sent out again to a different set of machines.

In theory, it's a fantastic concept. There really is a vast untapped resource out there in idling or semi-occupied CPUs – home users, offices, universities – during the day and certainly at night. The CPUs in our machines are capable of millions of instructions per second. Screensavers, typing, browsing, even many games don't come anywhere near to utilising the processing power of our CPUs. At the same time, there are plenty of scientific or philanthropic endeavours that call for mind-boggling amounts of CPU grunt. But many projects simply don't have the money to fork out for a multimillion dollar supercomputer.

Distributed processing is the answer.

Break it down for me baby

When a project calls on the power of distributed processing, there are two avenues to address. The first is writing the client and server software to break up the problem into distributable chunks and reassemble the results into a meaningful solution. From a network level, data is sent to and from clients just like any other data over the Internet using TCP/IP. The client-side software itself is simply a program that runs in the background of a user's machine, and these come in flavours for Windows, Mac, Linux, Solaris, and more. The clients can be basic programs that work at full steam, or polite ones that tone down their CPU usage if they detect you doing something more important, such as watching *Fight Club* on DVD. Some clients, like the SETI@home client, will even run as a screensaver and display nifty statistics.

The second avenue to address is social. It's all well and good to decide to tap into the wealth of unused CPU cycles flittering away around the world, but how are you going to get people to donate their cycles to your project? For the most part, the nature of the project is the biggest incentive. Some people like the idea of helping to look for alien life forms, or that their spare CPU cycles are helping to unravel the mysteries of our genes. But for those who require a monetary incentive, some projects offer cash prizes to individuals or teams who achieve a winning result, or pay you for each hour your beloved machine donates to the project.

Share your cycles

So, apart from the cool factor and warm feeling you get from being involved in a group project, why do so many people get involved? For a start there are so many projects currently running that there's bound to be at least one that piques the interest of every netizen. Regardless of whether you participate out of the goodness of your heart or for money, being a part of distributed processing is just good fun.

But for those who do go into for the money, there can be quite substantial rewards, depending on the project. The RSA challenges are an example of big money on the line.

RSA Data Security, a company specialising in secrecy, has posted a number of challenges on the Web to crack their ciphers, offering cash prizes as rewards. This allows them to test the security of their own products, or demonstrate the vulnerability of those they consider inadequate. In 1997, RSA posed a challenge to crack DES, the Data Encryption Standard, developed in the 1970s by the US Government. When it comes to code breaking, the easiest method is simply brute force; trying every possible combination until the correct key is found. For DES, a 56-bit key, this meant trying a number of combinations too big to write on this page (we're

In addition to the ones already mentioned, the explosion of distributed computing has led to the emergence of a whole swag of interesting projects you can currently join include:

United Devices **Web site:** www.ud.com

Centralises a number of projects dealing with medical research. The main project involves the search for cancer-fighting drugs. Participants of United Devices are entered into sweepstake prize draws.

Parabon Computation **Web site:** www.parabon.com

Also centralises medial research projects, including protein folding to help provide a greater understanding of cancer cells and how they interact with potential new treatments. Each participant can win \$US100 each day the client software is running, and one participant a month wins \$US1,000.

Folding@home **Web site:** www.stanford.edu/group/pandegroup/cosm

This is another project that deals with understanding the intricacies of protein folding.

Genome@home **Web site:** genomeathome.stanford.edu

A sister project to Folding@home, this project aims to better understand how natural genes and proteins work.

FightAIDS@home **Web site:** www.fightaidsathome.org

This project assists in research for AIDS by testing the evolution of drug resistance and helping in the design of anti-HIV drugs.

Porivo **Web site:** www.porivo.com

This project evaluates the performance of large Web sites. Participants are paid for each hour their machine remains online.

Grub.org **Web site:** www.grub.org

Grub is an open source, distributed Internet crawler that aims to create the most comprehensive, up-to-date index of the Web.

Moneybee **Web site:** www.moneybee.de

A screensaver that uses neural networks to analyse stock market charts and indices to predict future trends. Participants have access to the results. Note: The site is German; you can get a translation with BabelFish at babelfish.altavista.com.

Electric Sheep **Web site:** www.electricsheep.org

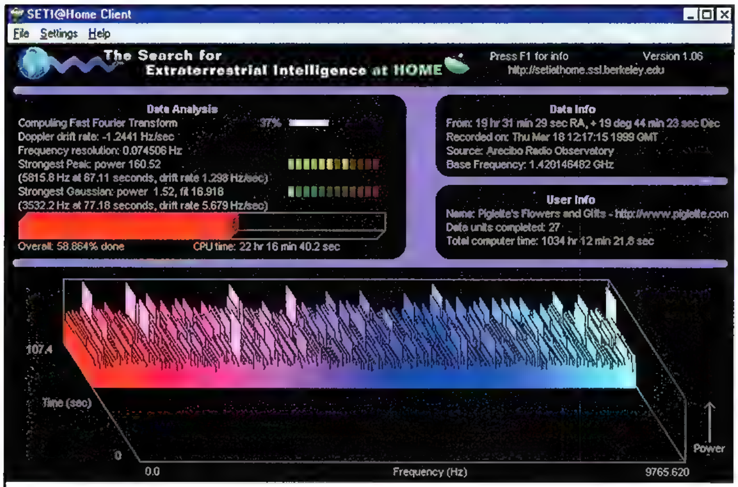
Electric Sheep is an interesting project that isn't out to save the world, but instead just create stunning fractal images as a screensaver. The more computers that participate, the more complex and remarkable the images become.

Golem@Home **Web site:** golem03.cs-i.brandeis.edu/download.html

Another screensaver distributed project, Golem creates and evolves life forms, some of which may evolve so far as to leave your humble PC and migrate to other machines in the project, and vice versa.

Cryptographic anecdote

In 1998, RSA posed another encoded message challenge based on the RC5-56 encryption that was cracked in 1997, but this time changed the rules. The \$US10,000 reward was to drop to zero after 67.5 days, thereby making speed the ultimate goal for the challenge. In the end, a member of the Bovine group found the key to the challenge after almost 90% of the possible keys had been tested. The decoded message read: 'Many hands make light work.'



Data Analysis
Computing Fast Fourier Transform 37%
Doppler drift rate: -1.2441 Hz/sec
Frequency resolution: 0.074506 Hz
Strongest Peak: power 160.52
(5815.8 Hz at 67.11 seconds, drift rate 1.298 Hz/sec)
Strongest Gaussian: power 1.52, fit 16.918
(3532.2 Hz at 77.18 seconds, drift rate 5.679 Hz/sec)
Overall: 58.864% done
CPU time: 22 hr 16 min 40.2 sec

Data Info
From: 19 hr 31 min 29 sec RA, + 19 deg 44 min 23 sec Dec
Recorded on: Thu Mar 18 12:17:15 1999 GMT
Source: Arecibo Radio Observatory
Base Frequency: 1.420146482 GHz

User Info
Name: Piglette's Flowers and Gifts - http://www.piglette.com
Data units completed: 27
Total computer time: 1034 hr 12 min 21.8 sec

ⓘ The popular SETI@home client in action.

> '. . . members of distributed.net are processing keys at 151 million keys a second, seven days a week!'

talking two to the power of 56 – yeah, that's just a wee small number). As it happens, in June 1997 after just 18% of possible keys were tried the correct one was found, winning the collaborative team going by the name of DESCHALL a $US10,000 reward (part of it went to charity). Another challenge posed later that year, using an encryption algorithm called RC5, was cracked in October 1997 after 47% of possible keys were processed – a whopping 34 quadrillion key combinations. The winning team called themselves Bovine, and consisted of thousands of members scattered around the world. This team later formed distributed.net (covered below). RSA's current challenge is RC5-64, for which members of distributed.net are processing keys at 151 million keys a second, seven days a week! Even so, the RC5-64 challenge has been running for almost four years, with another two years to go before they exhaust all possible combinations.

For projects that pay hourly for your time, the amounts are small but can add up to be nice pocket money for doing nothing more than leaving your machine switched on. One such project is Porivo, a company that tests the performance of customer Web sites by running testing clients all around the world through distributed processing participants, and paying them for their time.

Fame is also a reward, of course. If you haven't heard of SETI@home, you obviously have a life or something, for its popularised search of extraterrestrial life has captured the dreams and CPU cycles of hundreds of thousands of people. After all, wouldn't you like to be the one that found the first solid evidence of intelligent alien life?

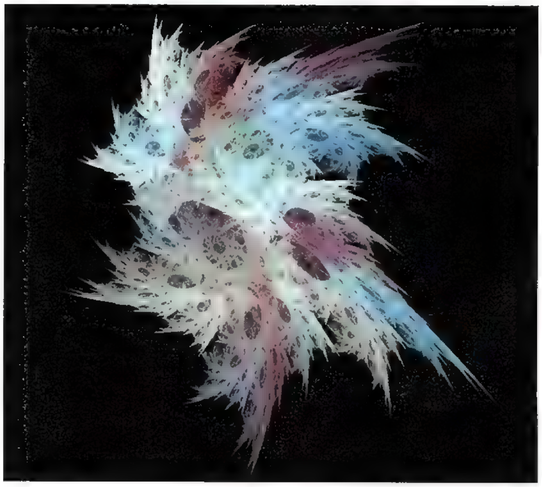
But mostly, people donate their idle grunt because they like to help. And while their PC is sitting there doing nothing, they figure they might as well put it to good use. Cable users are at an advantage here. It's not because their bandwidth allows them to get more data; rather, it's because their machines can send off results as soon as they are finished and receive more data, whereas modem users will do so only the next time they log on. Those with uber-machines screaming 1.2GHz down the highway will also be at an advantage, of course – the faster you can process data, the more data you can process, and the sooner a final result in the project can be found.

Don't get your hopes up, though. Projects that turn to distributed processing as a means to solve their problems do so because the problems they have to solve are huge. Some aren't too big and might be solveable by a team of a thousand participants over a few months. Others are so complex that tens of thousands of participants are involved, and even then, results aren't expected for many years. Or, as in the case of SETI, maybe never.

Distributed projects

There are plenty of distributed computing projects to donate your spare cycles to. The biggest is, of course, SETI@home (setiathome.ssl.berkeley.edu), with over 3 million users participating in the project. Next is distributed.net (www.distributed.net) weighing in with some 300,000 participating users. There are a variety of projects that span the range of chemistry, mathematics, physics, radio astronomy (such as SETI), and more.

In fact, there are even distributed projects that require you, and not your CPU. One example is Mindpixels, a project aimed at creating a massive general knowledge database – formed by everyday netizens such as yourself giving an online program statements of fact about the world — to eventually be used in creating powerful AI. Or, if you consider yourself a wordsmith, there is even a distributed project for editing volumes of literary work called Distributed Proofreaders. ▢



ⓘ Electric Sheep – screensavers worth processing for.

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3dfx Interactive (1994-2001)

James Wang dives into the mysterious depths of 3dfx Interactive's wreckage and its unfinished legacy.

A piece of 3D history

Who in the gaming world wouldn't have heard of 3dfx? In August 1994, the trio of Scott Sellers, Gary Tarolli, Ross Smith and a small group of ex-SGI engineers founded 3dfx. 3dfx pioneered mainstream 3D acceleration and forever changed 3D gaming. But on the bitter cold morning of December 15, 2000, 3dfx announced its plans for sell-out and dissolution. Why? What went wrong and who is to blame? What ever happened to the infamous Rampage project? The answers to these questions will be the focus of this article.

The good old days

3dfx was wildly successful with its Voodoo1 and 2 chipsets and the Voodoo2 SLI configuration, which ruled the gaming world in 1998. From there, it was a downhill slide for the company. After the unsuccessful Voodoo Rush and much delayed Voodoo Banshee project, 3dfx decided to purchase the board producer STB (Simply The Best) and make its own boards under the Voodoo brand name. This move is seen by many as the first in a series of mistakes that led to 3dfx's downfall, but this is not entirely true.

Yes, Rampage started in 1997

Rampage is the codename of the chip that would have served as the true successor to the Voodoo series. The 3dfx Rampage chip started design in 1997 and was slated to be released after the Voodoo2. This chip was originally designed to be a very flexible rasteriser with powerful pixel-shading capabilities. Although planned to be unveiled at Comdex 1998, that never materialised due to internal management and engineering obstacles. In a review meeting in November 1998, Rampage was scrapped for redesign.

Voodoo3 4000?

After the purchase of STB, 3dfx needed a product to keep its new plant in Juarez, Mexico, busy. Rampage was obviously not ready. So 3dfx did a quick die shrink of the Banshee, added a second texture memory unit (TMU) and the Voodoo3 was born. The Voodoo3, although lacking 32-bit colour, sold like crazy and remains the top-selling 3D board to date. However, 3dfx was no longer the king of 3D. NVIDIA's TNT2 had 32-bit colour support and dominated the Voodoo3 in reviews. In response 3dfx decided to design a Voodoo3 4000, but it never saw the light of day. The original Voodoo3 4000 was meant to add 32-bit colour and 4x AGP support and ship at a core speed of 183MHz plus. This got delayed as 3dfx sought to add new features like FXT1 and T-buffer (features actually borrowed from Rampage). The VSA-100 chip evolved from the Voodoo3 4000 project and would be the last chip from 3dfx. Adding 2KB x 2KB texture, T-buffer and scalability support to the Voodoo3 was obviously harder than 3dfx's engineering department initially estimated. The delays pushed the Voodoo4 and 5 cards back an entire nine months. As one of the ex-STB employees said of the Voodoo3 4000: *'They should have just shipped the bitch!'*

Too little, too late

After such a bitter delay, 3dfx finally shipped its Voodoo4 and 5 series in May 2000. But hot on its heels came the GeForce2 GTS and soon after, the MX. Unfortunately for 3dfx, the Voodoo5 just wasn't fast enough to compete with NVIDIA's latest monster, which outstripped it in both speed and features. Although the Voodoo5 exhibited excellent ^full-scene antialiasing (FSAA), it received bad reviews and low consumer enthusiasm. By this time 3dfx was in deep financial trouble after losing money for several quarters. In fact, the company burned some $US200 million every three months with nowhere near enough profits coming back. Obviously, 3dfx needed structural change and massive injections of cash. From insider accounts, a deal between 3dfx and VIA was close to being forged in which 3dfx would become a subsidiary of VIA, but in the end the deal didn't work out. After continuous negative returns and loss of investor interest, the company was forced to make a deal with archrival NVIDIA in which essential assets would be sold off and 3dfx would recommend that its shareholders vote for dissolution.

What went wrong?

In an interview on January 15, 2001, Gary Tarolli, 3dfx CTO, revealed: 'The big problem 3dfx had was execution. This problem stemmed from a variety of other problems in management, leadership, and company culture. Another problem we had was misjudging the retail market. Our biggest mistake was not really identifying the root cause of all these issues and doing something about it in a timely fashion. We tried various things, but nothing seemed to work. It was very frustrating. It's easy to say what was wrong in terms of visible problems, but it's very hard to identify the proper solution to the problem.' (Source: Reverend's 3DPulpit at www.voodooextreme.com/3dpulpit)

The 'execution' problem that Tarolli described is 'feature creep'. This is when a product experiences continuous delays as more features are added to be competitive with the existing market, only to find that by the time the features are ready, it is already overshadowed by new features that competitors have released. This can be traced back to the management decisions within 3dfx, which led to ongoing feature creep.

Although some say STB was a mistake and others say the Voodoo5 delay killed the company, at the end of the day all those issues were nothing in comparison to perceived incompetence at the management level.

Before the STB acquisition, 3dfx had a fair OEM product, which was a major source of profit. The Banshee was moderately successful as an OEM product, and this is bread and butter to a 3D company. NVIDIA understands this, which is why it grossed $US218 million in its fourth quarter. It's not the Geforce2 Ultras that earned it the cash; it's the humble M64 and MX range of cards. Management within 3dfx obviously didn't understand this until it was too late. The first thing they did after the STB acquisition was to fire their OEM coordinators. The second was to fire the people in Developer Relations. Ever go to NVIDIA's Web site? NVIDIA understands the importance >

Illustration Michael Cochrane

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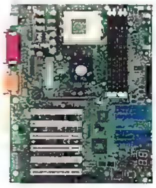

The 8K7A+ is based on the AMD 761 chipset. It features 6 PCI slots, an ISA slot for legacy devices, and 4 DIMM slots. It supports AMD CPUs up to 1.4GHz with bus speeds up to 266MHz.

Additionally it includes onboard Promise ATA100 IDE RAID 0/1.

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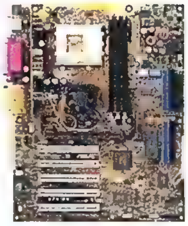

The A7V133 is based on the VIA KT133A chipset and supports the latest AMD Thunderbird and Duron socket A CPUs with bus speeds up to 266MHz.

Includes onboard Promise ATA100 IDE RAID 0/1 controller.

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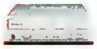

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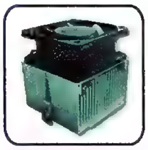

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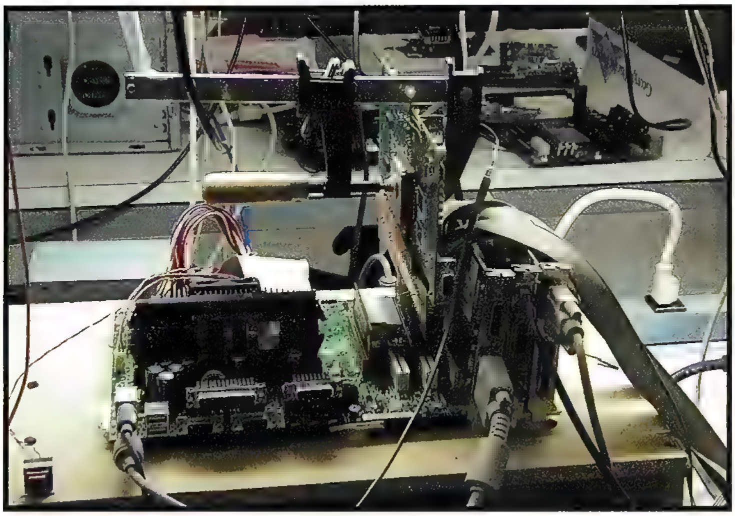


A board based on a single Rampage chip undergoes testing in the 3dfx labs.

of the relationship with developers, whereas the people at 3dfx effectively abandoned these relationships (and tried to resume them later).

Greg Ballard: Don't mention the name

Greg Ballard is the CEO who was at the helm when 70% of the 3dfx engineering staff left the company after the Banshee disaster. These people became disenchanted with Ballard after the disastrous handling of the Banshee project, delaying the product by eight months. Unsurprisingly, the majority of those engineers took up jobs at NVIDIA and turned their guns against 3dfx some two years later with the GeForce3. This massive outflow of engineers had a major negative impact on the development of the VSA-100 and Rampage.

On October 7, 1999, Ballard resigned and Dr Alex Leupp became CEO of 3dfx. He knew the company needed serious management reform and he was seen as the man with the vision to turn 3dfx around. He was successful too, sort of. He stopped further VSA respins and put the breaks on Rampage feature creep. 3dfx under Leupp also managed to purchase Gigapixel, an intellectual property company selling its Tile-Based Rendering (TBR) technology. Unfortunately, he was unable to save 3dfx in the end, due to inability to secure a line of credit.

Emmett Kilgarif: The man behind Rampage

While the VSA-100 was being developed and delayed, an engineer named Emmett Kilgarif took over and raised his own team to design Rampage and SAGE. Kilgarif managed to stop the delays on Rampage due to feature creep. Remember that these were not ordinary delays; the project started out in 1997 and didn't finish until late 2000 – almost four years of development. But Rampage is no Daikatana, it is the unfinished spectre of Kilgarif and his team.

Rampage: Four years in the making

Rampage was taped out (silicon design finalised) in the fourth quarter of 2000. It was based on a 0.18-micron process with 25 million transistors, and was slated to run at 200-250MHz depending on yields and stability. Each chip sported four pixel pipelines with one TMU assigned to each pipe. Its fill rate worked out to between 800 and 1,000 megapixels/megatexels. Although there was only one TMU per pipe, the chip could theoretically outdo the GeForce3 in multitexturing, as it could apply eight textures in a single pass. This was done using Rampage's texture computer and its unique 'loopback' function.

Rampage rasteriser

- Rampage texture computer with 'loopback'
- 3dfx M-buffer (multisample buffer)
- 2x/4x RGMS full-scene antialiasing
- Up to 128-tap anisotropic filtering
- 52-bit internal colour rendering precision/0-16 colour luminosity range
- FXT1/DXT1 texture compression
- 3D textures support
- True Photoshop filter effects in hardware
- Non-photorealistic rendering
- Cube environment maps/EMBM/Dot3 BM
- YUV texture formats
- One/two/four-chip scalability
- Fully programmable DirectX 8.0 1.1-compliant pixel shaders with additional features (DirectX 9.0)

Colour and movement

One of the big improvements in the antialiasing department was the move from T-buffer to M-buffer. M-buffer offers multisampling antialiasing, which is similar to supersampling except textures are not filtered. Multisampling only uses one base colour value for all subpixels. This means that, unlike supersampling, there is no fill-rate penalty. But a bandwidth penalty still applies. Multisampling is an optimisation that workstation GPUs have done for years, and is visually unnoticeable. However, it reduces the amount of texture look-up by a factor of four compared to the VSA-100 method, which translates to a significant performance boost.

If you've been keeping up with John Carmack you'd know he is pushing for higher internal precision in terms of colour. In fact, he wants 64 bits to work with. Although the human eye can't easily differentiate between 32 and 64 bits, it's the internal precision that matters to a game developer. Rampage had an internal colour accuracy of 52 bits (at 13 bits per RGBA colour component). This is otherwise known as 'overbright lighting'. The result is that outdoor environments with intense light sources are much more realistic. Indoor environments would have reduced darkening from the increased dynamic range.

Rampage also featured a special function called non-photorealistic rendering. This involves special rendering techniques that result in an output that looks like a cartoon flick. This is an interesting effect that creative game developers have being looking into for a while.

Rampage also supported 3D textures, which are part of DirectX 8 (support is actually missing from

Spectre: Rampage + SAGE

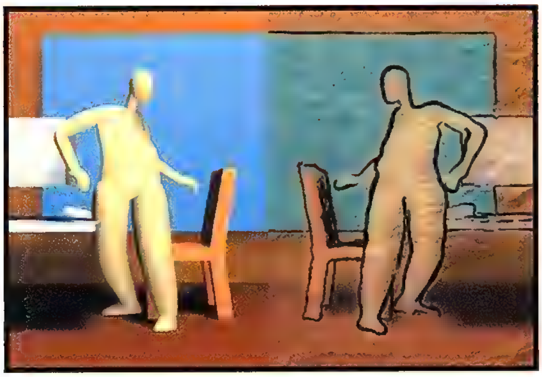
Tape out: Quarter 4, 2000
Projected shipping date: March/April 2001

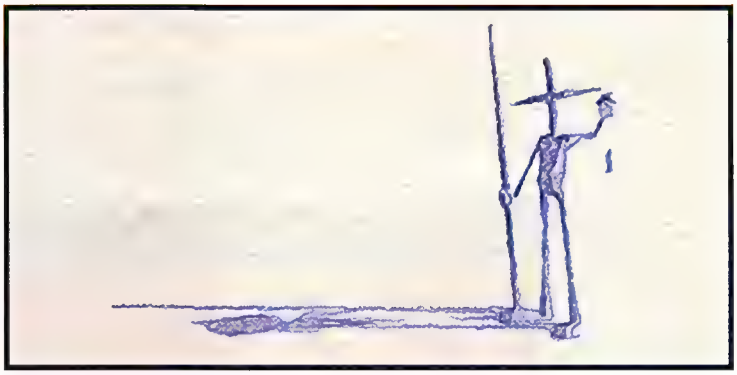
Rampage rasteriser: 25 million transistors
200-250MHz core
32MB at 200MHz DDR per Rampage chip
Manufacturing process: 0.18 micron
Four pixel pipelines/one texture memory unit per pipeline
Fill rate: 800-1,000 megapixels/megatexels

SAGE geometry processor: 12 million transistors
200MHz core
Manufacturing process: 0.18 micron
125 million vertices/s theoretical
50 million vertices/s sustained

SAGE geometry processor

- 52 million triangles through clipping stage, higher if all rejected and less if they need to be clipped
- 32 lights with overbright or negative lights
- Higher Order Surfaces, Bezier patches, B-Spline patches and Catmull-Rom spline
- Heightfield support
- Eight-matrix vertex blending with loopback function in order to increase the number to 16
- Geometry compression
- 128-vertex buffer
- On-chip vertex buffer (eight times larger than GeForce)
- Two-chip scalability
- Rampage can operate in conjunction with zero, one or two SAGE chips
- Fully programmable DirectX 8.0 compliant vertex shaders with extra features (DirectX 9.0)





ⓘ Two of the special Rampage features . . .
ABOVE LEFT: An illustration of the hardware-based Photoshop filters.
ABOVE RIGHT: An illustration showing non-photorealistic rendering.

the GeForce3). It also supported Photoshop filters in hardware. That's not mere lens flares or emboss; it supported true brush effects and filters. (See the illustrations above.)

SAGE (Scalable Architecture Geometry Engine)

3dfx's answer to TCL (Transform, Clipping and Lighting) was an external geometry coprocessor known as SAGE. SAGE was a very closely guarded secret of 3dfx. At Immersion 2000, developers were given the dump on Rampage, but the only mention of SAGE was that it would work in conjunction with Rampage.

3dfx didn't want to make the same mistake with the Mitsubishi IMPAC-GE T&L (Transform and Lighting) processor that 3dfx used for the VSA-100, which just wasn't fast enough. SAGE was specifically designed to be extremely powerful. It would have had its own memory and, according to 3dfx staff, it didn't return from fabrication in time for testing. The clock speed was 200MHz with a theoretical transformation speed of 125 million vertices per second (vertices/s). Its actual sustained output would have been 50 million vertices/s with support for up to 32 lights. Compared to the GeForce3, which has a peak output of 40 million vertices/s, SAGE would have clearly been more powerful.

SAGE was by no means perfect, as it lacked address ops. This drawback meant SAGE would not have offered a matrix palette, which game developers can use for complex skeletal animation. This feature also means SAGE would have only been DirectX 8.0 1.0 compliant, but not DirectX 8.0 1.1 compliant. Note that SAGE supported Higher Order Surfaces (HOS) in hardware (curved surfaces), which is similar to ATI's upcoming TRUFORM technology for the RADEON 2. The main difference is that SAGE would not have been able to convert traditional geometry into N-Patches in the GPU. While TRUFORM can convert all 3D geometry into N-Patches to make them appear smoother, SAGE is only capable of processing dedicated programmed B-Patches and Catmull-Rom splines.

What better way to explain SAGE's HOS features than 3dfx's own words? The following are extracts taken from 3dfx's unseen glossary for the Spectre line of boards:

- Bezier: A way of mathematically describing a curve, used by graphics programs such as Macromedia FreeHand and Adobe Illustrator.
- B-Spline: B-Splines are a formulation (Barsky and Beatty, 1983) of B-Spline curve segments. Barsky introduced two new degrees of freedom – bias and tension – which can be applied either uniformly to the whole curve or non-uniformly by varying their values along the curve.
- Catmull-Rom spline patches: Unlike a natural cubic spline, a Catmull-Rom spline has local control. This means that modifying one control point only affects the part of the curve near that control point.

3dfx Spectre

Rampage is the rasteriser and Spectre was the retail name for the board. As Rampage is a completely new rasteriser, 3dfx planned to ditch the Voodoo name. Spectre would have come in three flavours:

■ Low-end card: One Rampage chip and 32MB of DDR RAM at 200MHz

This would be the entry-level board with no significant T&L features, as it doesn't feature a SAGE chip. The board would have been very cheap and have DirectX 8.0 pixel shader compliancy, although the CPU would have had to do the vertex shaders. Rampage did have some limited forms of transformation abilities such as viewport transformation. Performance-wise this card would have been faster than the Geforce2 in high resolutions and FSAA, but the advantage would have been the DirectX 8.0 features.

■ Mainstream card: One Rampage chip and one SAGE chip

This card would have been behind the Geforce3 in terms of speed, only cheaper. It would have been DirectX 8.0 compliant and welcomed by many OEMs. In fact, many say this would have been the first 3dfx card to do well in the OEM sector. This is mainly due to its touted combination of low cost and comprehensive features.

Fear: Fusion + SAGE II

(Fusion = Hydra + Gigapixel technologies)
Tape out: March 2001 (projected)
Shipping date: August/November 2001

Fusion rasteriser: 50 million transistors
350-400MHz core
Manufacturing process: 0.15 micron
Four pixel pipelines/one transform memory unit per pipeline
Pixel fill rate: 1,400-1,600 megapixels/megatexels
Eight-layer multitexturing via loopback

SAGE II: 250 million vertices/s theoretical
125 million vertices/s sustained

Features (incomplete):
- Gigapixel/3dfx Hybrid tiler architecture
- Deferred rendering
- Hierarchical Z-buffer before binning
- Geometry compression
- 3dfx M-buffer (multisample buffer)
- Multisampling antialiasing with no performance loss
- Up to 128-tap anisotropic filtering
- 52-bit internal colour rendering precision/0-16 colour luminosity range
- FXT1/DXT1 texture compression
- Higher Order Surfaces
- 3D textures support
- True Photoshop filter effects in hardware
- Non-photorealistic rendering
- Cube environment maps/EMBM/Dot3 BM
- YUV texture formats
- Full DirectX 8.0 1.1 compliancy with certain DirectX 9.0 features
- Low power consumption

■ Flagship product: Two Rampage chips and one SAGE chip

This Spectre board would have been a killer product for 3dfx, for no other reason than pure bandwidth. While NVIDIA used DDR – the equivalent of 3dfx's SLI SDRAM solution for the VSA-100 – the same situation would not have occured here because Rampage supports both DDR and SLI. This board would have had more bandwidth than any mainstream card to date.

Effectively, 200MHz of DDR is 400MHz, and 400MHz using SLI translates to: 400 x 2 x 128 bits = 12.8GB/s. We all know just how important bandwidth is to a 3D card and with 12.8GB/s of pure bandwidth sitting alongside a fill rate of 1,600-2000 megapixels/s, this Spectre board would have given the GeForce3 a serious run for its money. At 32 bits, high resolutions and/or with FSAA, this card would have definitely outpaced the Geforce3. The downside to this card would have been the price.

As a final stab in the stomach, how close was the world from seeing Rampage? Damn close. According to 3dfx engineers and the internal 3dfx intranet log, Rampage was running DirectX 8.0 and OpenGL/Quake 3 just a few days before the acquisition by NVIDIA.

Fear, SAGE II, Fearless and Mojo

Make no mistake: Rampage would not have single-handedly pushed 3dfx back to the top of the industry. It was the first step toward bringing 3dfx to the top and back into the green, but it would take Fear to make 3dfx king again. If you recall, 3dfx purchased Gigapixel in March 2000. The TBR solution from Gigapixel could do FSAA at any resolution with no performance penalty thanks to its use of multisampling. It would also have very high bandwidth-saving advantages due to the use of TBR. Fear would have been the first product to include Gigapixel FSAA technology.

Before 3dfx bought Gigapixel, it was working on the Hydra rasteriser as the follow-up to Rampage. But after the deal went through, 3dfx and Gigapixel engineers combined the two architectures to form a rasteriser known as 'Fusion'. This rasteriser, when combined with the external SAGE II geometry processor, would have formed 3dfx's next-generation graphics card, Fear.

SAGE II would have had address ops fixed and the clock speed vamped high. This chip was designed to blitz the Xbox in terms of transformation capability (churning out 125 million vertices/s sustained).

As the name suggests, Fear was to be huge. Not in size (0.15 micron), but in terms of everything else. The main advantages of the Gigapixel core are very high clock speed and low voltage use. Initial software simulations within 3dfx showed Fear could operate at well over 300MHz and even up to 500MHz. An ex-

3dfx engineer stated that Fear would have shipped at around 350MHz and a low-end version at over 200MHz. He also claimed that Fear was on schedule to be taped out in March and shipped in the fourth quarter of this year. Fear was known as the Xbox killer within 3dfx and the team was determined to make Microsoft regret choosing NVIDIA over Gigapixel for its console foray.

To get an idea of how fast this card would have been, think no further than the KYRO II. The architecture is very similar, but Fusion would have been a much superior rasteriser. If a KYRO II can give the GeForce2 Ultra a run for its money in Serious Sam at a measly 175MHz on two pipelines, imagine a quad-pipeline KYRO II running at 350MHz. As a bonus, you can do 4x FSAA at any resolution or colour depth for free! All signs seem to indicate that Fear truly would have blown everything away.

Fearless would have been the next evolutionary step after Fear, in which the Fusion rasteriser and SAGEII T&L engine would be combined and die shrunk. Two versions were planned: one as the mainstream desktop solution, and the second was a smaller, mobile solution. Operating at a mere 3V, Fearless sounds like an appropriate name.

The 3dfx road map ends mysteriously with the obscure name 'Mojo'. Very little is known about this chip, but it would have been an integrated solution with a binning architecture. Crazy as it may sound, the 2D/3D pipeline would have been integrated and the chip would have supported 64-bit internal colouring. The chip had a host of other revolutionary features which were not finalised.

What happens now?

NVIDIA holds all 3dfx technology, patents and brand names. Will Rampage or Fear ever see the light of day? I'd suggest a 99% chance against this happening, despite the rumours flying around. But future NVIDIA products will inevitably be affected by its newly acquired 3dfx engineering crew. Just as the group of engineers who left 3dfx after the Banshee incident helped to shape the chipset that we know today as the GeForce3, the recent 100 or so engineers that NVIDIA has gained from 3dfx will be working on many NVIDIA products. In fact, according to a recent interview, NVIDIA stated that the NV30 will be the first product to 'owe' something to 3dfx architecture. Let's hope that NVIDIA has the vision to execute the best of 3dfx in future product releases. ○

Thanks to Dave Baumann for his assistance.

Two weeks in the life of Rampage

The following is the log kept by 3dfx engineering staff, and shows the progress made on Rampage in the last few weeks of its development and testing. The log has been taken from 3dfx's intranet, courtesy of Dave Baumann.

11/15/00 5:27 pm

Started Rampage bringup board being reworked. Rework is fixing power supply connection issues.

Estimated time to completion "a while". Probably about 8 hours to rework and verify.

11/16/00 3:20 PM

With a lot of work, the board engineers have been able to rework one bringup board. We currently have applied power to the first Rampage chip.

Bringup of the chip is underway. We are continuing to work on a clean up of the database for the first bringup board.

11/16/00 8:45 PM

The engineers have been working thorough intermittent contact problems in the socket area this evening. Progress has been slow because the chip responds for awhile then stops responding.

11/17/00 5:35 PM

Rampage bringup has made little progress today. This morning the engineers were able to read a few registers before the board stopped working. During the day the debug effort continued to point to socket issues. Therefore, we are currently mounting a chip down on the board in an attempt to make more progress. In addition, we are completing three more of the initial bringup boards. We are planning on reworking at least one more board.

The respin of the initial bringup board is underway. The current target for completion of the respin is Saturday about noon. We will not attempt to fab more boards until we have high confidence in the database. We will quick turn 3 to 5 boards to make sure the board is correct before building any larger quantity.

The second bringup board is continuing to make progress in layout including incorporating the new chip model. This board may be ready for fab by the middle of next week.

22/11/2000

Here is what has happened in the last 24 hours.

The new version of the initial bringup board bare fab arrive this morning and was sent to the assembly house. We should get new stuffed boards back Wednesday afternoon. The socket fits well on the new board.

Our next big push needs to be to get the memory working and stable. We got the DAC's aPwr and GND hooked up, and now we get relatively clean and stable garbage on the video monitor. We've been able to flash and read the ROM reliably, although there may be work left in the 32K-64K address range. We're bringing up our second board with Joe Minacapelli's patented socket holding device, and other rework to ensure stability.

PCI clock insertion workaround and PCI clock PLL fixes are underway. We've been able to do a 2d blit, but because the memory system's not stable, it didn't look perfect, but it did look like it did a blit.

We tried bringing up the windows driver with Rampage as the secondary device, and it recognized the card, and allowed us to debug some of the modeset code.

29/11/2000

Rampage is running but there are some stupid bugs. The DAC output is reveresed ... high is low and low is high which turns out to be rather sucky since displaying is difficult. Looking at a dongle to invert the inverted output.

Flash rom bug where part can't be written.

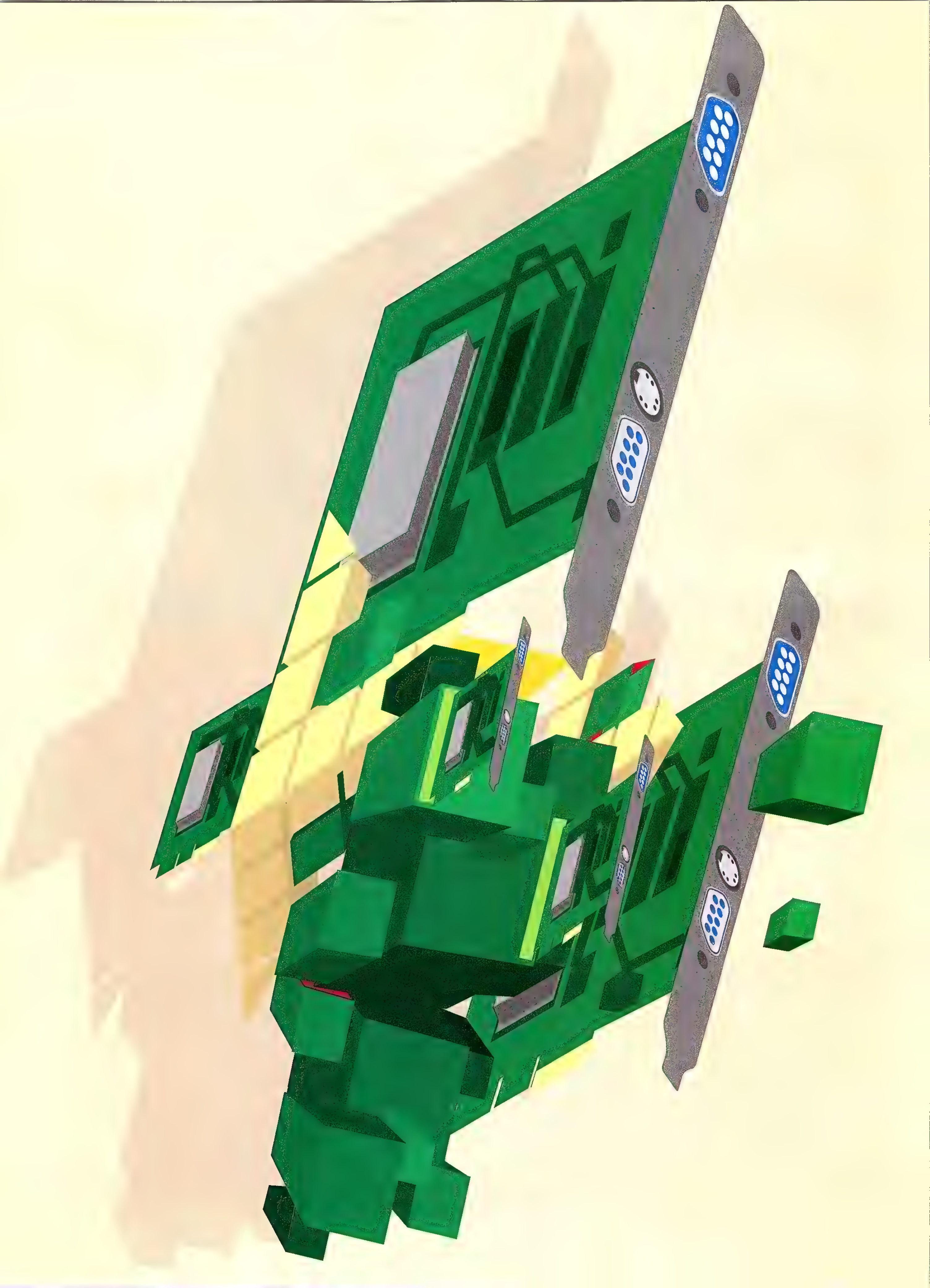
Fixes for both are possible in metal layers.

5 boards are operational.

30/11/2000

DAC output 'dongle' fitted.

Rampage running D3D applications.



GeForce3 Rumble

Finally, the GeForce3 is widely available. John Gillooly put eight of the beasts into a cage for a fight to the death.

Since the demise of 3dfx and the shifting focus of S3 after its merger with VIA, the high-end graphics market resembles a ghost town. The GeForce3 is so far ahead of all the competing cards that it has the potential to monopolise the market. Hopefully, we will soon be running ATI's follow-up to the RADEON, the R200, through its paces. But until then the GeForce3 is the unquestionable king of the castle.

The next potential competitor to the ATI/NVIDIA is the KYRO series of chipsets from STMicroelectronics/Imagination Technologies. At the moment the KYRO II is still lagging way behind the GeForce3 in terms of performance, and definitely sits in the mid-range. The rumoured KYRO II Ultra and KYRO III cards should act to slowly bridge this gap and finally bring functions such as hardware T&L onboard.

Similarly, just as we all started to forget about the enigmatic Bitboys, the company has started to make its presence felt again. While nothing too specific has been said about the hardware it has in development, at least it's talking publicly and reminding people of its continued existence.

> 'The main problem has been a worldwide shortage of GeForce3 chips. This has translated to a scarcity of the cards on store shelves.'

It's hard to believe that it has been almost five months since NVIDIA unveiled the graphics chipset previously known as NV20 at the Intel Developer's Forum. In those five months there have been a series of setbacks, and as a result GeForce3-based cards still haven't achieved much penetration in the mass market.

The setbacks started with the problems associated with bug-ridden early hardware revisions of the card, and were made worse by the fact that drivers were not finalised until the absolute last minute. The hardware problems were remedied for the, admittedly late, production card release, and eventually the official 12.41 Detonator drivers were finalised.

The big problem since then has been a worldwide shortage of GeForce3 chips. This has translated to a scarcity of the cards on store shelves, market stall tables and in online shopping carts. The reason for the shortage is currently unclear, but it is probably due to NVIDIA concentrating on the production of the XGPU and MCP for the upcoming Xbox launch in the United States.

On the upside, the GeForce3 has debuted on the market at a much lower price than initially expected. Up until the first retail cards appeared on shop shelves, no-one knew exactly what the price would be. Initial estimates of $1,500 have dropped to a much more reasonable price, with most of the cards sitting in the $999 price range. If you hunt around a little, the cards can also be found selling for less.

atomic has gathered together eight different cards from across the price spectrum. Generally, these cards conform closely to the NVIDIA reference design. However, there are some variations in RAM brand and speed, and definite variations in both the price and build quality of the cards.

The atomic workout

The GeForce3 cards have all been tested on our 1GHz Athlon testbench using the Detonator 12.41 drivers. The 12.41 official driver release does not work with Coolbits, so in order to disable V-Sync and enable the hardware overclocking settings you need to download one of the more recent 'leaked' Detonator versions from www.3dchipset.com or www.reactorcritical.com. Once you have installed the 12.41 drivers, open the leaked drivers in a zip program and extract the file nvcpl.dll into your windows/system directory (or winnt/system32 for Windows 2000), overwriting the existing file. This needs to be done because the 12.41 Detonators have had their control panel crippled in order to obtain a WHQL (Windows Hardware Quality Labs) certification. Remember, you only need to do this if you want to disable V-Sync or overclock your video card.

Because all the cards tested use the same chipset, they have been run through a slightly different suite of benchmarks to our usual ones. 3DMark2001 Pro (www.madonion.com) has been used because of its reliance on DirectX 8.0 features, as has a beta version of Fishtank Interactive's Aquamark (www.aquanox.de), which takes advantage of the pixel shader and antialiasing functions of the GeForce3 (and future DirectX 8.0-compliant video hardware). We've also used Serious Sam for its comprehensive feature set.

Because of the need for strict adherence to NVIDIA's reference specifications, the differences between the cards are not huge. In fact, some of the cards we have seen appear to have been made in the same production run. Each card runs at a 200MHz core speed and 460MHz RAM speed. The only major variation is the inclusion of lower latency 3.8 nanosecond RAM on some of the cards. There is, however, a big difference in the approach taken by each manufacturer to cooling, outputs, bundled software and general card design.

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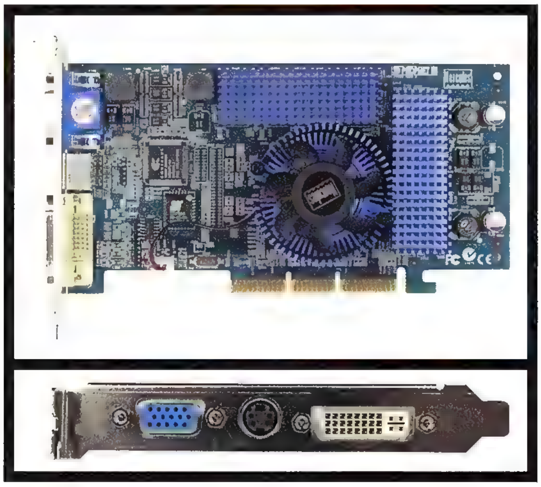
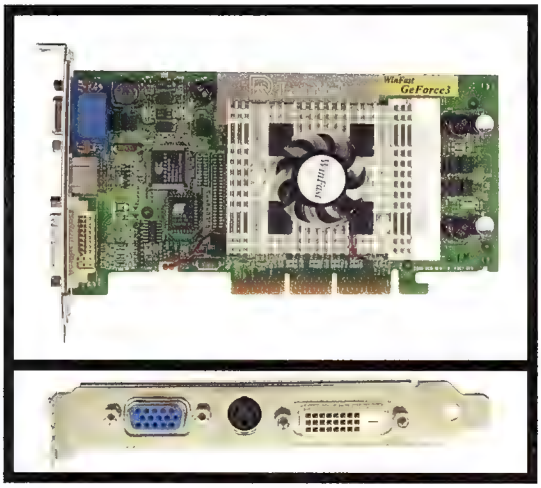


Hercules Prophet III

Price: $999

Distributor: Hercules www.hercules.com

Industry stalwart Hercules was one of the first to have a card on the market. The Prophet III shows the quality of engineering we have come to expect from Hercules, with the trademark blue PCB sporting a low- profile version of Thermaltake's blue orb cooler, and two blue RAMsinks.The card comes bundled with CyberLink's PowerDVD software.

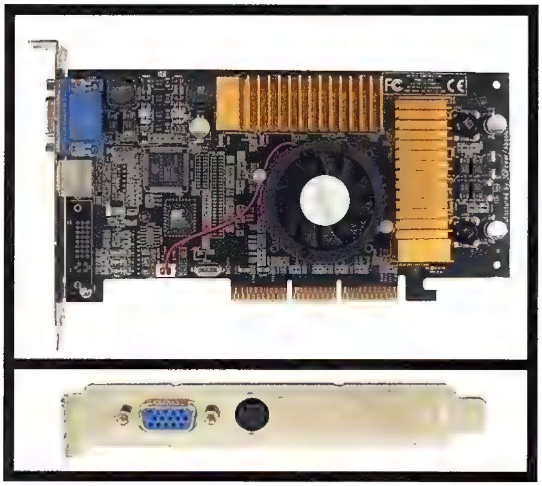


Leadtek WinFast GeForce3 TD

Price: $999

Distributor: BCN www.bcntech.com.au

Leadtek's offering in the GeForce3 stakes is a very well-made card. The trademark ugly silver heatsink is perhaps the most striking aspect, covering both the core and RAM well. The card comes bundled with a pile of extra software, including Leadtek's WinFox hardware monitoring utility, WinDVD and Colorific colour calibration software.



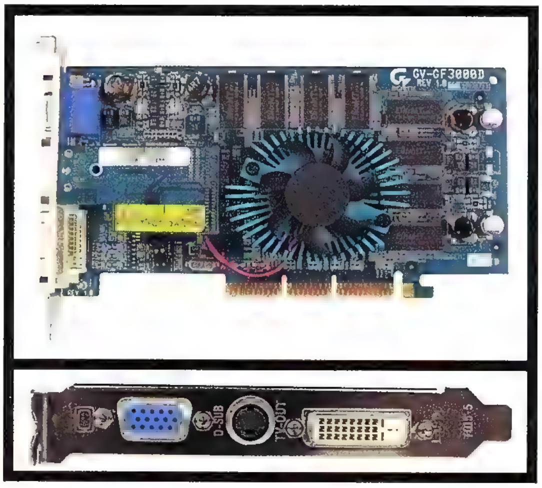
3D Power Morpheus

Price: $895

Distributor: Innovision www.innovision.com.au

3D Power is the new kid on the graphics card block. Its entire product range is pitched directly at the gaming market, and it's shaping up as a name to look out for. The Morpheus GeForce3 sports 3.8 nanosecond RAM covered by two serious-looking RAMsinks, which is a huge boost to high-resolution performance. Also sitting on the black PCB is a round purple cooling fan for the chipset.

The card comes in a stylish wooden box and is bundled with two games and a mail-in slip to receive a copy of No-One Lives Forever.



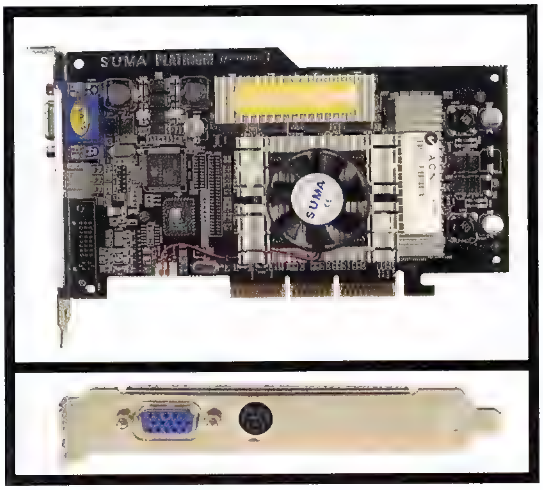
Gigabyte GV-GF3000

Price: N/A

Distributor: Hallmark www.hallmark.com.au

The Gigabyte GV-GF3000 we received was what is sometimes called a 'reviewer's special'. When we checked the card, it was running with a core speed of 220MHz and a RAM speed of 510MHz. We contacted Gigabyte and received confirmation that the card's retail speed is in fact 200MHz for the core and 460MHz for the RAM. The overclock was hardwired into the BIOS of the review sample, so we had to underclock the card back to normal speed.

The card sports a funky blue heatsink, but unlike the other cards, does not have any RAMsinks.

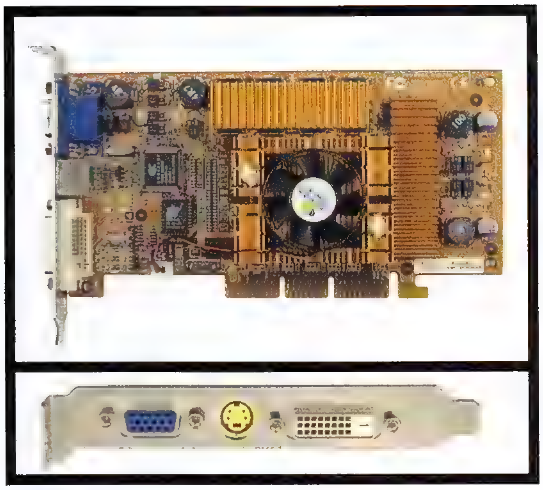


SUMA Platinum

Price: $799

Distributor: e@pc www.e-pc.com.au

Korean manufacturer SUMA is another newcomer to the Australian market. The Platinum GeForce3 sports silver RAMsinks and cooler on a black PCB. The card looks great and, despite the fact that the RAMsinks don't completely cover the RAM, it's well constructed. The card comes in a funky silver tin and includes SUMA DVD, a reskinned version of VaroDVD.

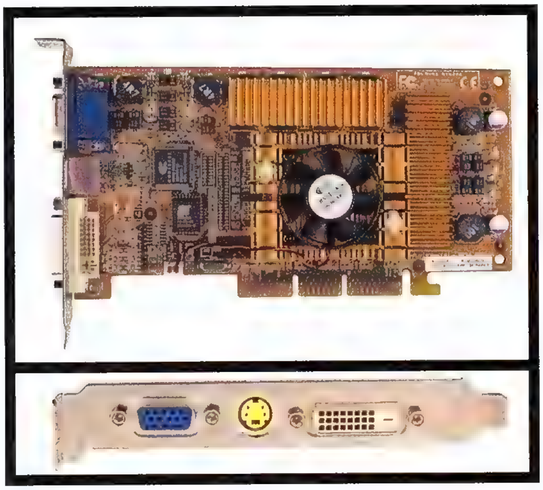


Prolink PixelView XX-Player

Price: $819

Distributor: Emagen www.emagen.com.au

Prolink's PixelView card is physically identical to the PowerColor Chameleon. This includes the ill-fitting RAMsinks. In fact, the serial numbers of both cards only differ by a few numbers and they appear to have been made by the same foundry. The PixelView card comes bundled with Ulead VideoStudio SE and CyberLink's PowerDVD.



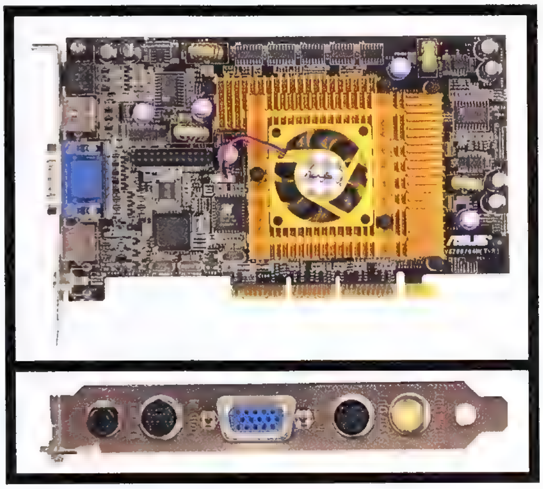
PowerColour Chameleon

Price: $750

Distributor: Altech www.altech.com.au

PowerColour is perhaps the best-known budget brand in Australia. With the Chameleon it has continued the trend of providing a good performing card at a jaw-dropping price. One of the interesting things about this card is that it is identical to the other budget card in our round-up, the PixelView XX-Player – even the manuals are identical. There are a couple of worrying things about the card, most notably the poorly fitting RAMsinks.

The model we tested comes bundled with DVD software and *Unreal Tournament*.



ASUS V8200 Deluxe

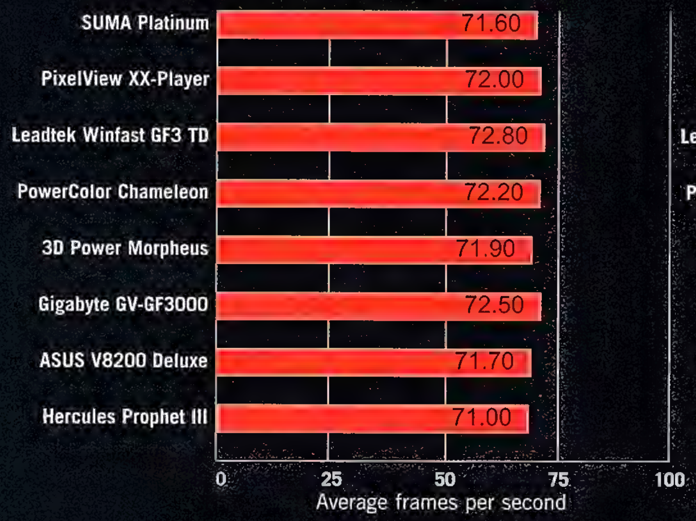
Price: $999

Distributor: Achieva www.achieva.com.au

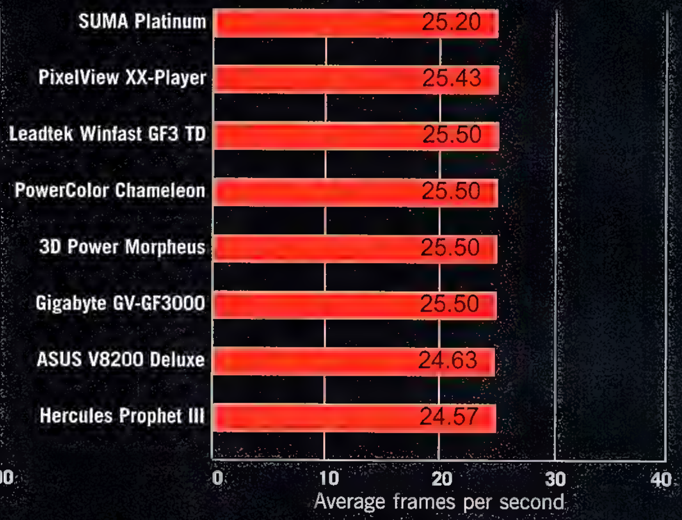
ASUS' Deluxe version of the V8200 is an awe-inspiring piece of hardware. The basic premise has been to cram as much extra stuff onto the card as possible. This includes TV In and Out, 3D glasses and a pile of bundled software. The card itself shows the move by ASUS towards black PCBs and a huge set of orange RAMsinks and chipset cooler.

The card includes a swag of software including Messiah, Sacrifice, Star Trek: New Worlds and Ulead VideoStudio. Besides the TV-Out, the card also has a 15-pin D-Sub VGA connector.

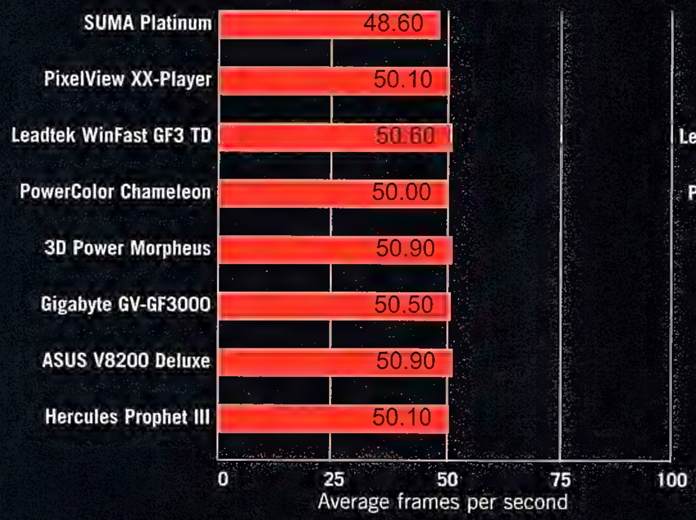
Serious Sam 1,024 x 768/32-bit



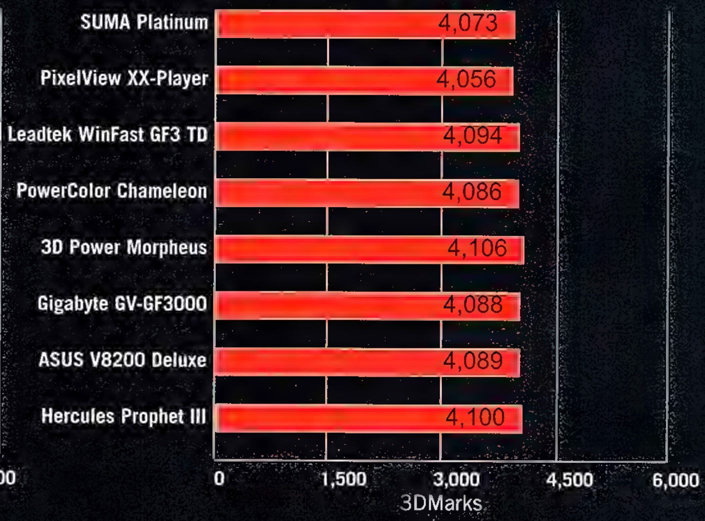
Aquamark 1,280 x 1,024/32-bit



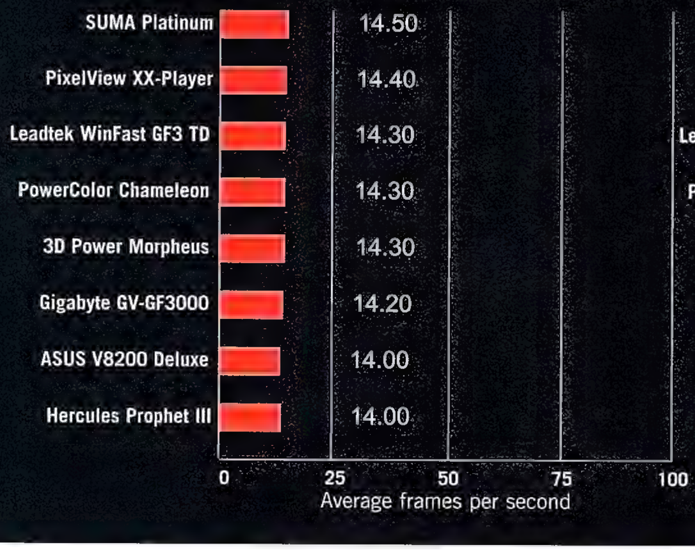
Serious Sam 1,600 x 1,200/32-bit



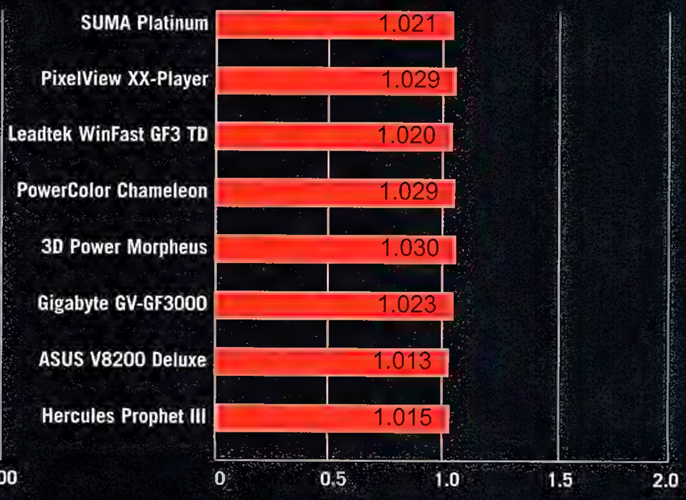
3DMark2001 Pro 1,280 x 1,204



Serious Sam 1,600 x 1,200/Four-way split



Normalised results



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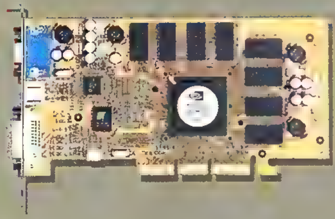
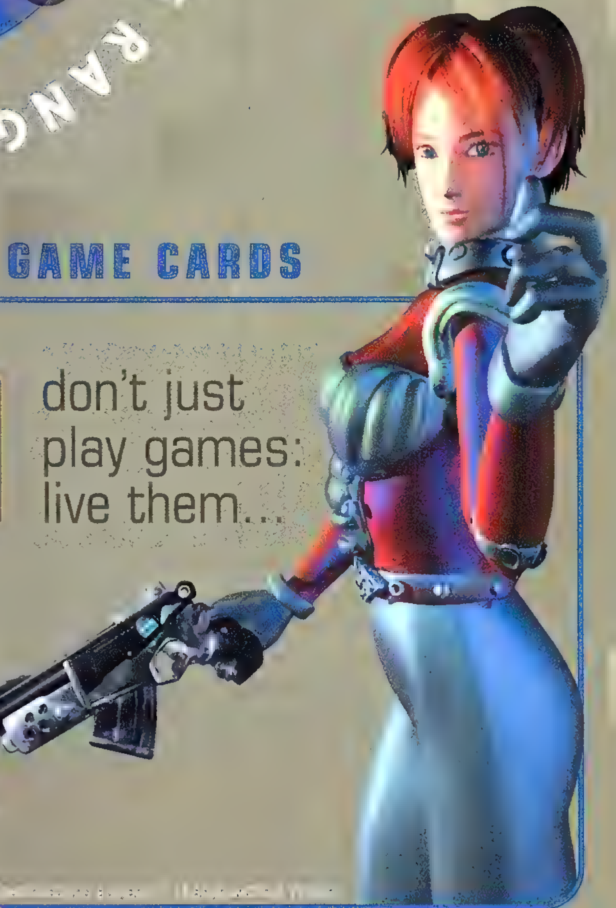


PowerColor
GeForce2 MX-400
Nvidia GeForce2
MX-400 GPU
32Mb SDRAM Memory
Clock 166Mhz–175Mhz



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And the winner, by a nose . . .

In Serious Sam, the differences between the cards were almost negligible, with the majority of tests coming down to under one frame difference between competing cards. Even though we have published the Aquamark results, the benchmark still has a fair way to go in its development. The results tend to vary wildly between runs, and they show no significant difference in frame rate between normal and antialiased performance.

The 3DMark2001 Pro results were also incredibly close; there was only a few hundred 3DMarks difference between the fastest and slowest cards in all our tests.

The final scores have all been normalised against the slowest performer in each test, giving us a series of relative results for each card's overall performance. The end results are extremely close, which reflects the general level of variation in the tests run.

The 3.8 nanosecond RAM on the 3D Power Morpheus helped to boost the card's performance at high resolutions and pushed it into the overall lead in the normalised results. Combined with the high-quality construction, an attractive price and the quality software bundle, it is definitely a card (and company) to keep an eye on.

For those who want an abundance of features and are prepared to pay a bit extra, the ASUS V8200 is a great, feature-packed card.

Even though their performance is good, the construction of the PowerColor Chameleon and Prolink PixelView cards leave a lot to be desired.

One interesting point is that perenially high performer, Hercules, has not taken the extra step to squeeze that last drop of performance out of its card by adding faster RAM.

Despite the scarcity of competing chipsets, it is great to see that card manufacturers are trying to add something extra to their products. Whether you are focused on price, looks or just plain speed there is a card that will suit. Unlike previous years, the decision is no longer about what chipset, it is now all about the extra touches.

Aquamark

Special thanks to Fishtank Interactive for giving us the chance to get our hands on a prerelease copy of Aquamark, the benchmark based on the upcoming game, Aquanox. As one of the first game engines designed to take full advantage of the GeForce3's pixel shaders, Aquamark gives us a good picture of how the cards will perform under software that is designed to take advantage of the features.

The cards were tested at 1,280 x 1,024, with 32MB textures and pixel shaders enabled. Because this is an early release of the benchmark, there is only a minimum number of options and outputs, so we decided to use the average frame rate values in our testing

'The 3.8 nanosecond RAM on the 3D Power Morpheus helped to boost the card's performance . . .'

Serious Sam

The recently released shooter, Serious Sam, contains an extensive suite of in-game benchmarks. In an evolution from the traditional Quake timedemo method of benchmarking, Sam includes demo-based benchmarks. However, these runs provide a wider range of information than Quake 3. Each demo run outputs the average frame rate, average frame rate without excessive peaks, and high and low peak frame rates. It also includes a set of synthetic benchmarks that test fill rates and other information.

For our GeForce3 testing we focused on the demo-based benchmarks, purely because the synthetic ones are best used to compare between graphics chipsets. The demo we chose is called Karnak Peaceful Nights Co-op, and puts maximum stress on your graphics hardware. We have tested using the Quality graphics settings in Serious Sam at 1,024 x 768, 1,280 x 1,024 and 1,600 x 1,200. In addition to these resolutions we also ran the demo at 1,600 x 1,200 in four-player, split-screen mode. This places a huge burden on the graphics hardware and provides a picture of how the cards perform when they are copping a serious hammering.

The demo runs output a variety of results. We have chosen to display the average frame rate (without peaks) – which cuts out some of the high and low frame rate spikes – to give a more representative average result. We have also used the low sustained frame rate result in our normalised score, largely because it gives a good indication of the worst that the card will perform in the game.

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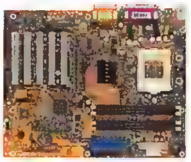

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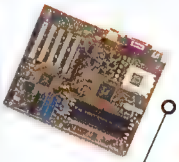

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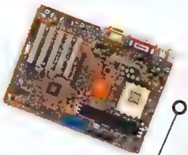
- Ultra DMA 33/66/100 supported
- 5 PCI slots / 1 CNR / 6 USB ports
- ATX form factor



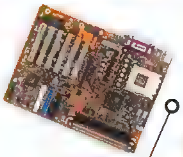
AK75

AC' 97 · ATA 100 · Hardware Monitoring

VIA®KT133A Socket A
FSB 266MHz/AGP 4x/ATX

- VIA KT133A/686B chipset
- Supports AMD Duron/Athlon CPU
- 266/200MHz Alpha EV6 FSB for CPU
- AGP 4x supported
- 3 SDRAM DIMM up to 1.5GB PC133/PC100
- Ultra DMA 33/66/100 supported
- 5 PCI slots/ 1 CNR/ 4 USB ports
- AC'97 sound
- ATX form factor

Radometer 9 out of 10
"Editor Choice"
UK Radeonic web



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FSB 266MHz/DDR266/AGP 4x

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- Supports AMD Duron/Athlon CPU
- 266MHz Alpha EV6 FSB for CPU
- AGP 4x supported
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- Ultra DMA 33/66/100 supported
- 6 PCI slots/ 4 USB ports
- ATX form factor

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reviews

Abortive Usage Policies

In last month's hardware reviews intro, I stated that Telstra's BigPond ADSL service was back up to acceptable performance levels, and even went as far as to wholeheartedly recommend it for those who wanted a broadband connection but couldn't get access to cable. Mere days after writing this piece came the shocking news that Telstra was to implement a 3GB cap on both its 'unlimited' cable and ADSL accounts.

When I first heard this news, I have to admit that I wasn't particularly phased. Three gigabytes of data should be more than enough for my meagre needs, or so I thought. Soon after announcing the new Acceptable Use Policy, Telstra had its usage meter online, so I headed over to see how far below 3GB I had used in the previous month. Low and behold, 2.5GB of ones and zeroes had been delivered to my PC courtesy of the ADSL postman in the previous month. And I thought I'd had a quiet month in terms of Internet use!

I use the Net for about four hours each night, with an additional 15 or so hours of use on the weekend. I rarely, if ever, download anything of considerable size, but I do play a lot of online games, as well as stream both radio and Webcasts. I'd class myself as a medium-level user of the Internet, but definitely not a heavy user (unlike when I was a student and had lots of spare time!). So how the hell did I manage to chew through 2.5GB of bandwidth?

Let's look at online gaming first. Tribes 2 is my current online favourite, and it takes up approximately 5KB/s when using the highest quality voice codec. At this speed, it chews through roughly 300KB per minute. So if I play for four hours every day, I'll be using about 72MB of data each day. Multiply that number by 30 days to get the monthly usage, and it turns out that I end up using just over 2GB of bandwidth per month solely for gaming. Considering that many people now prefer to play online games rather than watch TV, we can see that my four hours per day could be quite low compared to heavier users.

So all I've done is play some games and I'm already two thirds of the way through my monthly allowance. Now, suppose I also want to download a few demos or movies throughout the month. The average game demo now weighs in at around 100-150MB, so I can only download six or seven new demos each month. This leaves me with no more bandwidth for Web browsing, emailing or streaming media off the Net.

Speaking of streaming media, it is one of the heaviest uses of bandwidth. As a matter of fact, it's one of the uses of broadband that Telstra was so heavily pushing in its advertising campaign when I signed up for my 'unlimited' account. It's not unusual to stream a Webcast at over 20KB/s, and if I were to do this for a full 24 hours, I would easily exceed 1.5GB of data in one day. In fact, if I were to download at the maximum speed my 512KB/s ADSL connection allows for a full day, I would use the entire 3GB limit within the space of 24 hours!

So what can we do about this? Not a lot, it seems. Already there are several online petitions, and the amount of protest that ensued even saw the Telecommunications Industry Ombudsman (TIO) get involved.. Unfortunately, the TIO is now saying that it is within Telstra's rights to make these changes to its AUP. One Web site in particular (www.sitehappens.com.au), is collecting donations towards a full-page protest advertisement in The *Australian* newspaper (which has kindly offered a 30% discount to the organisers). They're already up to $13,000 at the time of writing this, so there is obviously a substantial number of unhappy Telstra users out there.

The only other option users have is to disconnect from the Telstra network. At this point I should note that Telstra has offered to disconnect users who aren't content with the limit, without charging them the usual fee associated with disconnection. But there has been no mention of reimbursing people for the installation fees (several hundred dollars) that both cable and ADSL involve. And for people who don't have any other broadband options (that being the majority of Australians), going back to dialup is going to be a painful process after the speeds offered by cable and ADSL.

Personally, I'm going to stick with my BigPond ADSL service, because it's the only broadband option I have. If I do start breaching the 3GB cap, it will be time to head back to the 56K modem. But make no mistake, I'm not happy that Telstra has introduced limitations that negate many of the benefits that I signed up for in the first place.

Bennett Ring

atomic benchmarks

Take a look inside the atomic Labs testing procedures.

Here at atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the atomic Labs.

atomic Applications Benchmark

The atomic Applications Benchmark suite uses an assortment of off-the-shelf applications and is an excellent test of a system's overall performance – including CPU, RAM, hard disk and graphics card – when running conventional 2D programs. Desktop resolution is set to 1,024 x 768 at 32-bit colour, DMA is enabled and the latest drivers are used for all hardware, including chipset inf updates.

SiSoftware Sandra 2001 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specifications and settings of a system by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress testing overclocked systems.

3DMark2000 Pro

3DMark2000 Pro from MadOnion (www.madonion.com) is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced Max Payne 3D engine, which is representative of the latest in Direct3D performance and technology.

3DMark2001 Pro

3DMark2001 Pro from MadOnion (www.madonion.com) is the next progression of the popular benchmark. It also uses the MAX-FX engine from Max Payne and heavily emphasises DirectX 8.0 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Quake 3: Arena

Quake 3: Arena (Q3A), from id Software, is the extremely popular first person shooter that represents the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and some built-in demos that can be used to test graphics card performance. These demos are fairly simplistic, however, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own atomicmpc demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas such as hard disk performance, or a particular facet of 3D like T&L or SSE. For these specific purposes we can draw upon a vast number of applications, games and dedicated benchmarks such as CD Speed 99 (www.cdspeed2000.com), DisplayMate (www.displaymate.com), Evolva, MDK2, Adaptec ThreadMark, Aquamark or Serious Sam.

Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures as well as any settings that we use. ▢

atomic testbench specs

There are two testbenches in the Labs: one for running AMD processors and one for Intel processors. Both are running Windows Me, DirectX 8.0a or DirectX 8.0, Live!Ware 3.0 for Windows Me, and Detonator 12.41 drivers

- **AMD Athlon Thunderbird 1GHz system – ASUS A7V133 motherboard**
- **Intel Pentium III 1GHz system – ASUS CUSL2 motherboard** (Both supplied by CASSA, www.cassa.com.au)
- **Intel Pentium 4 system - Abit TH7-RAID motherboard** (Supplied by Abit, www.abit.com.tw)

Common components

- **Transcend 128MB PC133 CL2 SDRAM** (Supplied by CASSA)
- **Transcend 128MB PC2100 DDR RAM** (Supplied by CASSA)
- **Samsung 256MB PC800 RDRAM** (Supplied by CASSA)
- **Hercules Prophet II GTS 32MB** (Supplied by Guillemot, www.hercules.com)
- **SoundBlaster Live! Player** (Supplied by Creative Labs Australia, www.creaf.com)
- **ASUS 12x DVD-ROM** (Supplied by CASSA)
- **7,200rpm Ultra DMA/100 20GB hard disk**
- **Floppy drive**

Benchmark settings

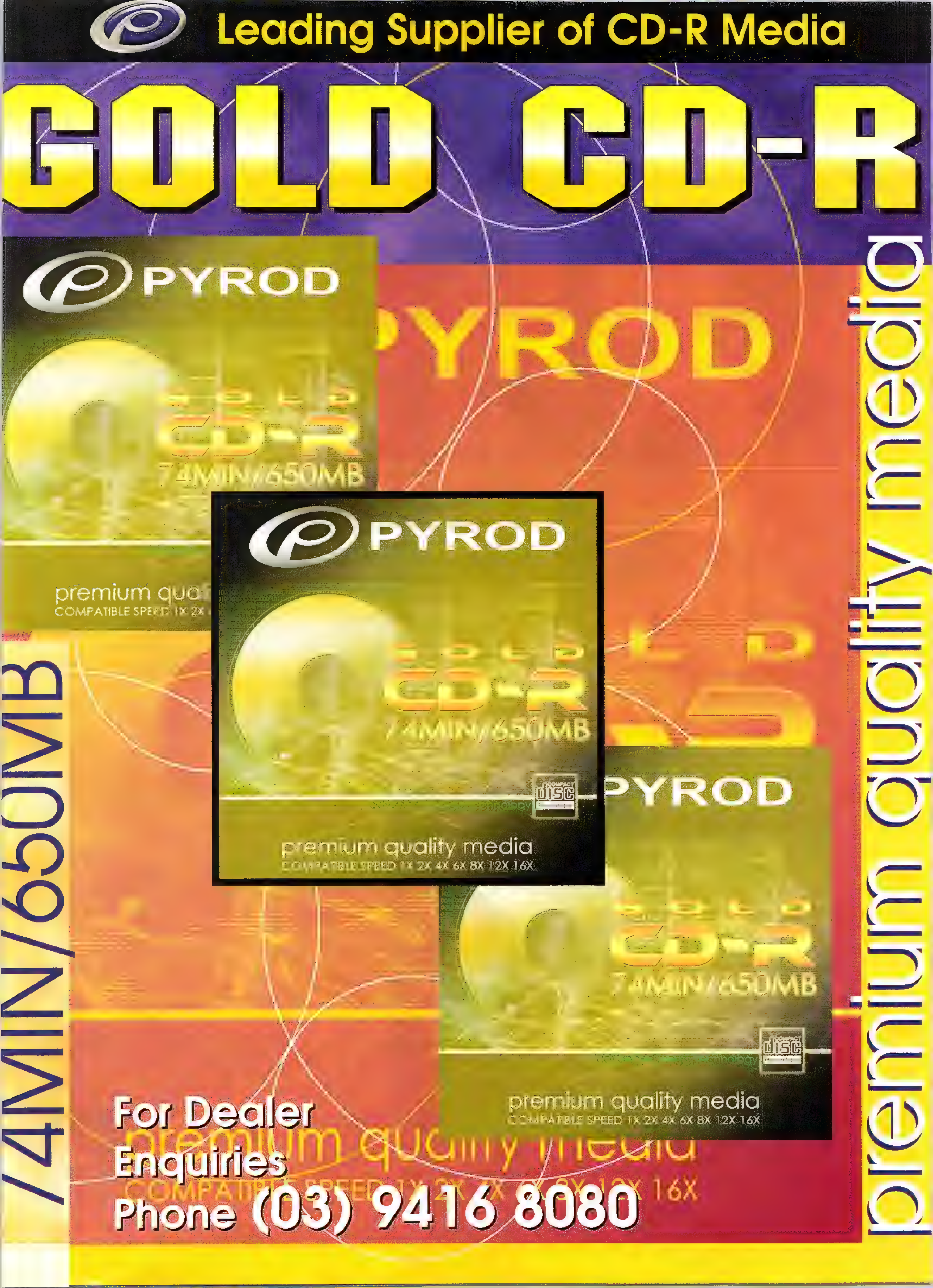
3DMark2000 Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer

Quake 3: Arena atomicmpc demo

All tests use Quake 3 1.27g

- CPU: 320 x 200, maximum geometry detail, minimum graphics settings, high sound quality
- Graphics cards: 640 x 480, normal quality graphics settings, high sound quality
- 1,024 x 768, maximum graphics settings, high sound quality
- 1,600 x 1,200, maximum graphics settings, high sound quality



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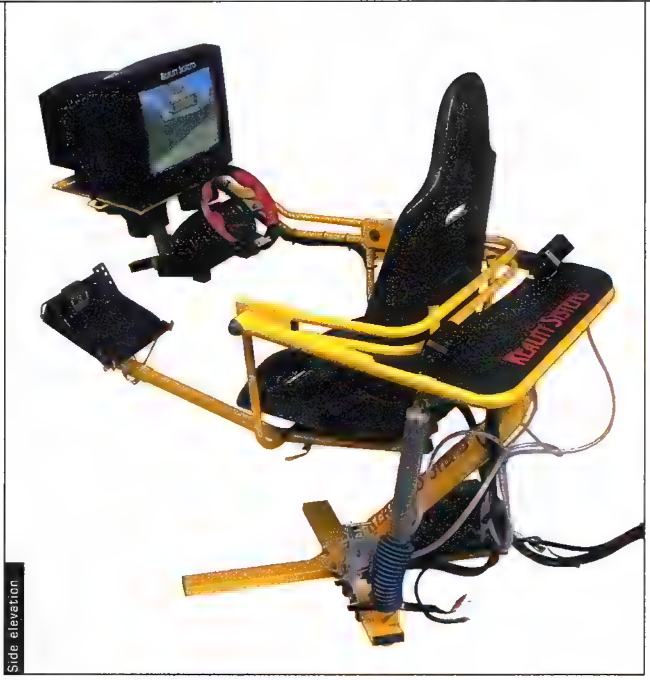
XGP pneumatic chair

Rocking Bennett Ring's world is this beast of a gaming peripheral.



Side elevation

If you're an old-school arcade gamer, you'll probably remember the release of Afterburner. This was one of the first arcade games to ship in a full-motion hydraulic cabinet, and the hype that it generated exceeded what the gameplay deserved. It's been a long time coming, but now the XGP pneumatic chair finally brings full-motion simulation out of the arcade and into the home.

> '. . . the XGP chair finally brings full-motion simulation out of the arcade and into the home.'

While most arcade units and professional simulators use hydraulics to power their movement, the XGP uses pneumatics, or air pressure. By using pneumatics, the chair is easier to maintain, cheaper to produce and a damn sight less messy if anything happens to work itself loose. Pneumatics have been avoided in full-motion simulators in the past due to the compressibility of air, which leads to less accurate movements in comparison to a hydraulic (liquid-based) unit. This means that the increment of movement for a pneumatic system was usually limited to 5° at the least. Reality Systems has now eliminated this problem. The unit moves in tiny 1° increments, giving it the ability to move smoothly through both of its axes.

The chair has a range of movement of 60° up and down, and 50° from side to side. This doesn't sound like a great deal, but after being tossed about all over the place like a 14-year-old who is high on hormones, you soon realise that it's more than enough. A three-bar compressor powers the pneumatic system, ensuring safety in the event that any pipes break or come loose. This relatively weak compressor provides enough power to move the chair, because the chair acts like a large pivot balanced between the monitor's and the player's weight.

The XGP uses one of three different software methods to control the chair's positioning. The most precise method is the use of special drivers built by Reality Systems for the most popular racing and flight sims. Games that already have working drivers include FS2000, Microsoft Combat Flight Sim 1 and 2, Falcon 4, Colin McRae 2, and several other high-profile simulations. The second method, which is still being worked on, is the use of a DirectX patch. This method uses the DirectX input signals to figure out where the chair should be. This should function with any game that uses DirectX to handle its input.

The final and least precise method is to directly connect the chair to the control device, which uses the output from the input device to determine the chair's position. While this is the least preferable option, it allows the chair to be used with any game that requires a steering wheel or joystick.

When the chair arrived in our office, configured in its car racing form, it was only a matter of seconds before a crowd had gathered to watch it in action. One after another the atomic employees had their turn on the chair, and there wasn't a single driver who wasn't wearing a maniacal grin the entire time. After an extended period of time playing Breakneck on the XGP, I have to admit that this chair rocks my world, literally! Sorry, but I had to fit that joke in somewhere.

As the car accelerated to top speed, the front of the chair slowly pointed to the sky and pushed me further into my chair, simulating the G-forces we feel in the real world when punching the pedal to the metal. Tap the brakes and the front of the chair would dive into the ground, almost sending the unknowing driver into the monitor. Likewise, turning the in-game car left and right would swing the chair in the opposite direction, again roughly simulating the effect of Gs in a hard turn.

Occasionally, the machine would 'hiccup', jerking unexpectedly from left or right back to the centre position. But, thankfully, this was not a regular occurrence. And even though the unit we tested only had a 15in monitor in place, the immersion was simply amazing. The only other problem was the lack of a guard around the unit, as there are a couple of spots on the chair that would like nothing better than to chew on probing fingers. But as long as you keep your hands away from the frame when it's in use, you should remain digitally intact. A protective shield is currently in development to eliminate this danger.

At just under $4,000, these chairs are only for the seriously wealthy or seriously addicted to car/flight sims. Regardless of the hefty price tag, the XGP pneumatic chair is the ultimate gaming peripheral, and brings gaming simulations in the home one giant leap closer to reality.

SPECIFICATIONS

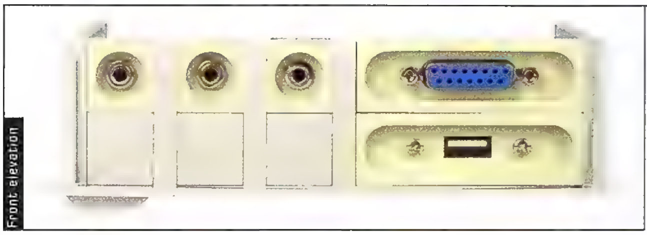
Weight: 48kg; movement: 50° roll and 60° pitch in 1° increments; three-bar air compressor. Available in car or aviation setup

Contact: Reality Systems (02) 9632 5942

atomic

8.5/10

FrontX Audio Patch Panel Kit



The location of ports at the back of the PC has always been the monkey on the back of PC users. Having to waste precious energy reaching around the back to plug your speakers back in can be downright annoying. Because of this nightmarish situation PC manufacturers pioneered the relocation of ports to the front of the PC.

The problem is that the majority of cases don't have these features, which has led to a wide range of third-party and even homemade solutions. The FrontX Audio Patch Panel Kit provides a modular solution for the lack of port quandary.

The kit installs into a spare 5.25in drive bay. From the back of the panel wires run through to the back of the case, where a special blanking plate allows the cables to exit the PC. The cables then plug into the ports on the back of your PC and voila, you have functional ports on the front of your system.

This does introduce the major setback with this solution. Each port has its own cable running through the system. This is an eclectic collection of single cables, ribbon cables and a bizarre fusion of the two. This becomes a bit too bulky for cable ties, and would be a tight squeeze for any kind of sheathing you may employ. The cables will definitely interrupt the airflow of your case, which will be fine for the 'beige box of mystery' crowd, but not so ideal for the perspex panel lovers.

The panel features one nice touch. There is a limited degree of customisation available, with new ports available for purchase, so you can create the panel that you want. The standard unit comes with line in, line out, microphone and game ports, and there are a variety of add-ons available like USB and serial ports.

FrontX has managed to provide a very useful but decidedly simple solution to common port problems. Just be prepared to cope with the increased clutter that comes from such a huge amount of cabling flowing through the heart of your PC.

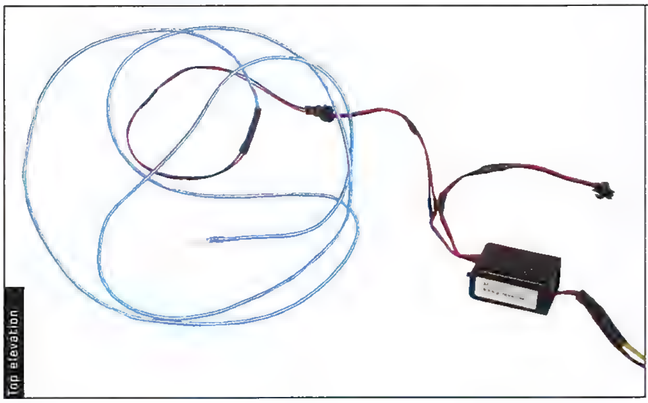
SPECIFICATIONS

5.25in drive bay panel, line in, line out, microphone and game ports. USB and serial ports also available. No special motherboard connectors needed.

Web site: www.bodylink.com.au **Price:** $49

atomic 7.5/10

PC Case Gear EL Wire kit



Electro-luminescent cable is a recently developed technology. It comprises several thin layers. First, there is a copper core that is coated with a phosphorus material. Then, two very fine transmitter wires are wrapped in a spiral around the core. A 120V inverter/driver is used to send a high-frequency signal through the cable, causing the phosphorus to glow. The whole thing is covered with a PVC insulating layer. The natural glow is aqua, so for other colours a coloured vinyl coat is added.

The kit comprises one 1.5m section of flexible 3.2mm plastic cable, a 12V driver module with two output lines for two EL cable circuits, and a power lead with a large 4-pin Molex connector. The driver module is a high-voltage inverter with an integrated on/flash/off switch. The kit is available in aqua, blue, red or green, and there may be more colours in the future. EL cable is quite bright to look at directly, but provides a diffuse illumination.

The kit is connected to the PC's power supply using the Molex connector included with the kit. You may need to purchase a double adaptor, as the connector is not a passthrough connector. The driver module is small and can be mounted to your case using double-sided tape or velcro. The power and output lines are long enough to mount on the back of the case, giving easy access to the switch. Once the driver is mounted, the EL can be threaded around your case to highlight the features that you want to show off. The 1.5m section of glowire is long enough to a loop around the main compartment of a full tower case.

The wire could be combined with clear tubing or plexi tubing to create glowing conduits that also keep your cables tidy, or even mounted under the keys of your keyboard.You can create two different colour circuits by simply adding a second 1.5m section of cable. EL cables can also be cut to any length or joined together using heat shrink tubing. Adding in ordinary speaker wire can create unlit sections. Detailed instructions on how to do this are provided, though it is fiddly, as the wires inside the cable are very fine.

EL is not as bright as a neon tube, but it is flexible and can be artfully placed. For the case modder who wants something different that looks sexy when the lights are out and the mood is right, the EL will appeal.

SPECIFICATIONS

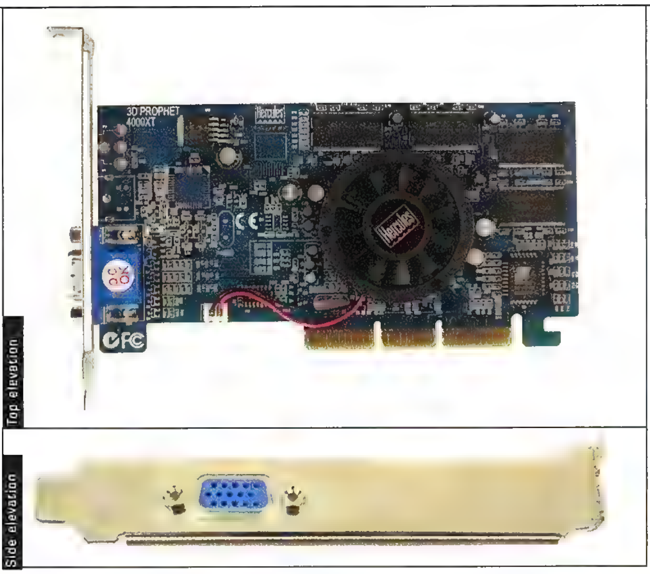
1.5m glowire cable (3.2mm thick), four different colours, very low power draw, on/off/flash control, 4-pin non-passthrough Molex connector

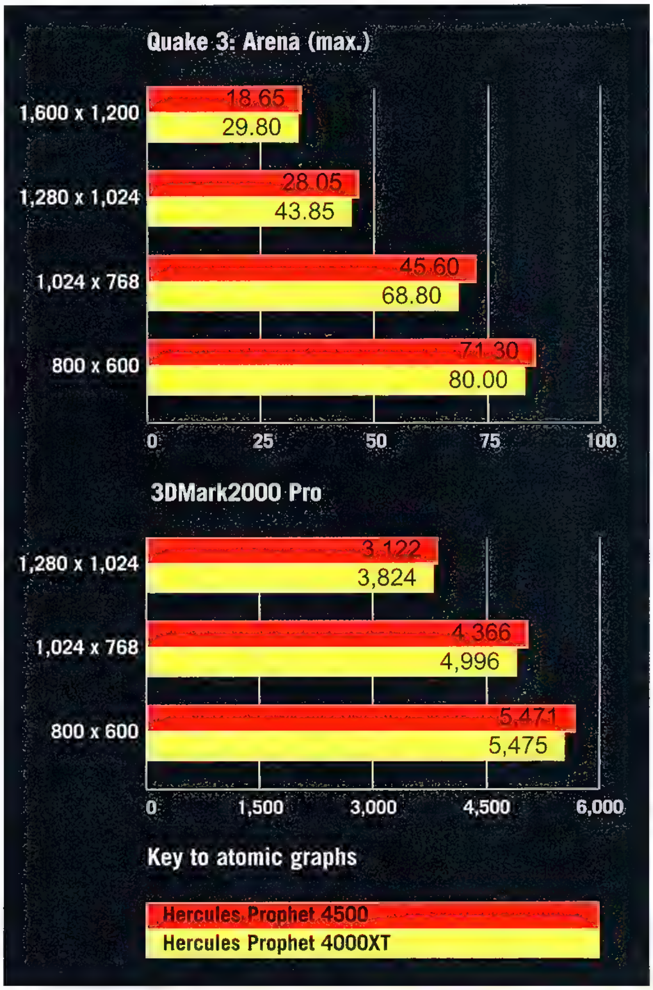
Web site: www.pccasegear.com.au **Price:** $59

atomic 7/10

Hercules Prophet 4000XT

John Gillooly witnesses the resurrection of the KYRO.





The current trend in the low-end video card market is variety. NVIDIA signalled this with the diversification of its MX cards in order to occupy the low end of the market, and this has been mimicked by Hercules with its decision to produce a card based upon the original KYRO chipset.

The KYRO was first released late last year and had minimal impact in Australia, largely due to the small number of manufacturers that adopted the solution. This changed when Hercules announced that it was to produce cards based upon the KYRO II. Rather than a true successor, the KYRO II was essentially a KYRO with a die shrink to 0.18 micron and a concurrent rise in core (and memory) speed.

The Hercules Prophet 4000XT uses a slightly modified version of the original 0.25-micron KYRO core running at 115MHz. The additions largely revolve around added S3TC texture compression support.

Because of the lower core speed and larger process, this card does not reach the heady performance heights attained by the KYRO II cards. What this card does provide is true budget performance. For only $200 the card is truly at the low end of the price scale, dwelling among the likes of the GeForce2 MX 200 and TNT2 M64.

> '. . . this card does not reach the heady performance heights attained by the KYRO II cards.'

The 3D Prophet 4000XT was tested on our Athlon testbench and compared to its big brother, the KYRO II-powered 3D Prophet 4500. The results show that the faster core and RAM speeds of the KYRO II card start to come into play at higher resolutions. In Quake 3 the Prophet 4000XT is playable at 1,024 x 768, but starts to chug as the resolution increases. The 3DMark2000 scores show a similar trend, with a significant drop in performance at higher resolutions. The card will benefit significantly from having the fastest possible CPU behind it.

Another interesting factor that stems from the KYRO's console roots is that it performs well and looks stunning at low resolutions with antialiasing turned on

For a cheap upgrade the 3D Prophet 4000XT is an incredibly attractive option. While its performance sits light years away from the latest and greatest video hardware, it can certainly hold its own with the other cards in its price range. As long as hardware T&L support isn't something you crave and you are happy playing at 1,024 x 768, then the 3D Prophet 4000XT will serve you, and your wallet, well.

SPECIFICATIONS

STMicroelectronics KYRO chipset, 32MB SDRAM, 115MHz core and RAM speed, D-Sub output, round blue heatsink/fan with heatsink on back of card

Web site: www.hercules.com **Price:** $199

atomic
8.5/10

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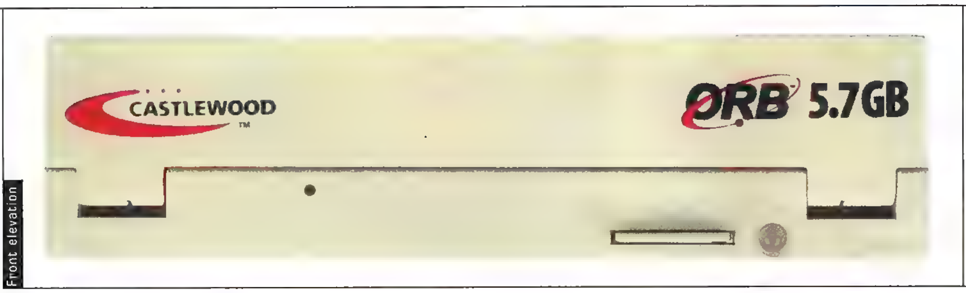
atomic HOT

5.7GB ORB Drive



If you've got anything to do with large amounts of data, you'll most likely use a high-capacity removable media drive. The technological advances of these devices over the last couple of years have been astounding, leaving even Moore's Law spluttering in its wake with ever-increasing disk capacities and performance. The latest drive designed to capture your backup bucks is Castlewood's 5.7GB ORB Drive.

This 5.7GB EIDE internal drive packs a whopping 5.7GB of data onto a disk that is slightly larger than your standard 3.5in floppy disk. At $149 for a 5.7GB disk, the cost per megabyte is an amazingly low 2.6 cents. When compared to the cost of similar removable media devices, we can see that the ORB Drive offers astounding value for money.

The drive's advertised maximum theoretical sustained data transfer rate is a massive 17.35MB/s. This sounded extremely high to us, so we installed the drive in our reference testbed and ran a couple of benchmarks. The first test timed how long it took to copy 1GB of various files from the ATA/100 hard drive to the ORB Drive, while the second timed how long it took to copy a single 1GB Zip file to the ORB Drive.

After an incredibly simple installation process that didn't require any driver installation, the sustained data transfer rate for the 1GB of various files measured at 2.24MB/s, while the compressed file copied over at 2.36MB/s. These figures are nowhere near the advertised maximum speed, but when compared to the speed of other removable media devices, the ORB comes in at the faster end of the pack.

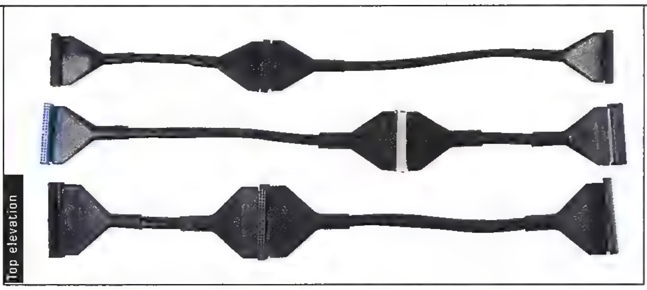
If you're looking for a removable media drive, the 5.7GB ORB is hard to beat. Offering unprecedented value for money along with exceptional performance and high capacity, the ORB Drive should prove popular with anyone who needs to transfer large chunks of data in the minimum amount of time. ▢

SPECIFICATIONS

EIDE Ultra DMA/66 5,400rpm Internal ORB Drive. Windows (WHQL certified) and Macintosh G3 and G4 compatible, 5.7GB disks, backwards compatible with 2.2GB disks
Web site: www.castlewood.com **Price:** $849

atomic
9/10

Rounded drive cables



While the rest of your PC's components have been evolving at the speed of light over the last 10 years, there is one component that has been sorely neglected. That's right, it's time your floppy, IDE and SCSI cables got the upgrade overhaul. But how could you improve on ye olde ribbon cable?

Rounded cables are the way of the future! The bulky ribbon cables of the past can't compare to the sleek, sexy lines of these designer cables. Actually, they're not really that sexy, but they are a darn site easier on the eye than the tangle of grey ribbon cables present in most PCs.

And not only do they look much better, they offer a real benefit to your PC – added air cooling! Compared to a ribbon cable, the rounded cables offer much less resistance to the airflow through your case, provided by the 17 additional cooling fans you've installed. Hence, with rounded cables in place, the air should flow through your case more quickly, lowering overall system temperatures.

Another benefit of using these cables is the deforestation of the cable jungle within your PC, making maintenance and upgrading that little bit easier. All that said, the main feature of the cables is definitely their aesthetic qualities, so they will mostly appeal to those with perspex windows in their case.

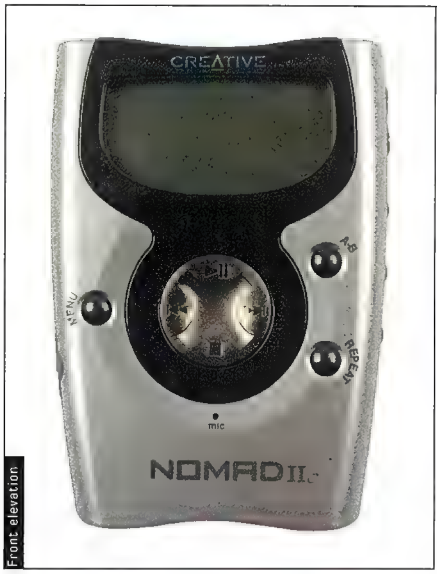
The only drawback of these cables is their cost. At about $70 for a SCSI 68-pin LVD (with six connectors), these aren't the cheapest cables around, even if they are the most stylish. However, the IDE and floppy cables are much cheaper, costing about $38 for both, and making them affordable to even the poorest PC builder. It's only a matter of time before ribbon cables go the way of the Atari Jaguar (that is, extinct!) because the future has arrived, and it is round. ▢

SPECIFICATIONS

ATA 66/100 IDE cable **Price:** $23; floppy cable **Price:** $15; SCSI 50-pin **Price:** $25; SCSI 68-pin LVD (four connectors) **Price:** $49; SCSI 68-pin LVD (six connectors) **Price:** $69
Contact: Oxygen Technology (02) 9792 8888

atomic
8/10

Creative Nomad IIc MP3



The Nomad IIc MP3 player from Creative Labs is a curious hybrid of previous offerings in the Nomad range. It's hard to decide whether this is actually an upgrade or a downgrade.

For those who came in late, the original Nomad came with 32MB flash memory, a SmartMedia expansion slot, FM tuner, voice recorder and a parallel port link to a PC. The sleeker shaped Nomad II used a USB link and dispensed with the flash memory, relying solely on a SmartMedia card.

The Nomad IIc regains the 32MB flash memory and takes the shape of the Nomad II. It has the voice recorder and expansion slot, but not the FM tuner. A USB cable, a belt clip and PC/Mac software are supplied. Items such as headphones, AC charger and a music CD that are standard with other models are all optional.

Using the Creative PlayCenter 2 software for ripping and transferring tracks is quick and easy. The software generally works well and supports various MP3 and WMA compression formats. However, the file management is disappointing. It is quirky and files supposedly deleted actually remain on the hard disk.

Playback is the same high quality as other Nomads, although equaliser functions are limited. The 32MB memory stores one hour of music at 64KB/s, or 30 minutes at 128KB/s. The way to use this player would be to use WMA format, as it provides CD quality at 64KB/s – half that of MP3. The player will also store up to two hours of voice recording.

The Nomad IIc is Creative's attempt to make its MP3 players more affordable. It has a reduced set of features without comprising the core qualities of the Nomad II range. At $399 it offers better value than other players at the same price, but it also competes with similarly featured MD players that have a greater storage capacity.

SPECIFICATIONS

32MB built-in flash memory; 61mm x 93mm x 21mm; 110g including one AA battery for eight hours of power; SmartMedia card slot; USB cable; supports MP3 and WMA audio formats.

Web site: www.australia.creative.com **Price:** $399

atomic
6/10

Cambridge PlayDock PD200

Cambridge SoundWorks is well known for its computer speakers and home theatre systems. It is also a subsidiary of Creative Labs. So it's not surprising that the PlayDock PD200 is designed expressly for the Nomad Jukebox MP3 player, though it will work with any suitable sound source.

The Nomad Jukebox is an MP3 player about the size and shape of a portable CD player. Instead of storing files in RAM it uses a 6GB hard disk, providing the capacity to store more than 100 hours of music, or 150 CDs, in MP3 format. The PlayDock is a compact, self-contained, amplified speaker system. It has two features that set it apart from other portable speaker systems. First, it integrates closely with the Nomad Jukebox. Second, it houses a 12V 4.5Ah rechargeable lead-acid battery. This powers two tweeters and a central subwoofer. Weighing just under 6kg, the PlayDock is heavy but easy enough to carry using the integral handle.

The Jukebox is attached to the PlayDock by enclosing it in a specially moulded flexible plastic glove. After mounting the glove on top of the PlayDock, line-out and power supply cables are connected to the player. There are independent controls for on/off, volume, mute and wide effect.

Sound quality is impressive, with a crisp tone, good bass output and very little distortion at high volumes. The top end sounds a little tinny, but this is easily controlled using the EAX equaliser settings on the player.

The instructions claim eight hours use per 12-hour charge at 'moderate' volume levels, or 10 hours after 48 hours charging. So we were surprised when it lasted for 11 hours after a 12-hour charge.

Overall, this is an impressive combination. These two products allow you to take 150 CDs to a party anywhere, with up to 10 hours of reasonable quality music and no need for a power supply. Just the thing if you're a camper. Sadly, the total cost, $799 for the Jukebox and $499 for the PlayDock, will deter many buyers.

SPECIFICATIONS

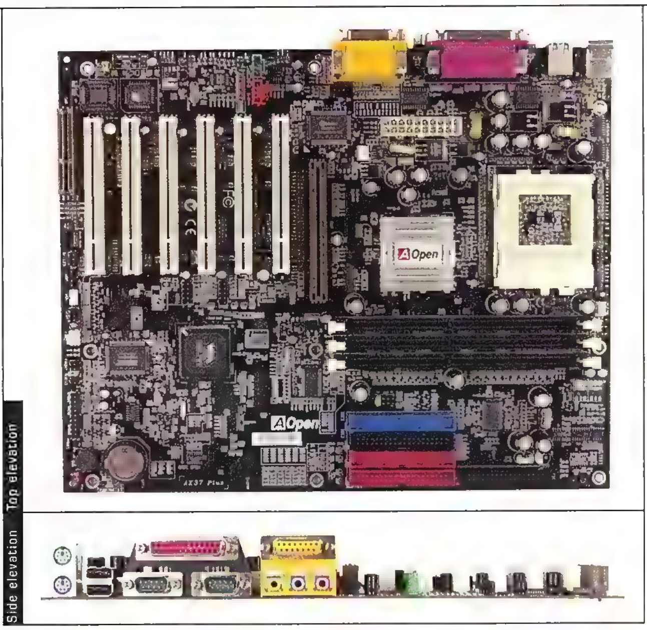
Two 6cm tweeters at 7W RMS per channel; 10cm subwoofer at 15W RMS; internal eight-hour rechargeable lead-acid battery. Designed mainly for use with the Nomad Jukebox MP3 player

Web site: www.australia.creative.com **Price:** $499

atomic
8/10

AOpen AX37 Plus

John Gillooly looks into the black heart of a new PC.

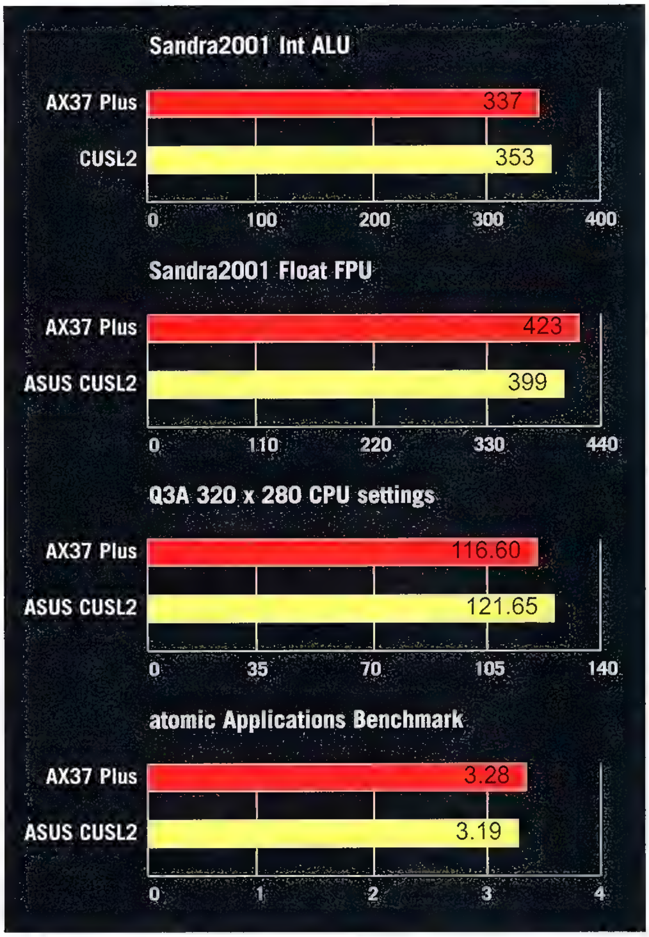


The steady march of the Apollo Pro 266 chipset continues despite the recent stagnation of the Coppermine Pentium III at 1GHz. The AOpen AX37 Plus couples this chipset with a black PCB and IDE RAID to provide one of the best-looking Pentium III boards out there.

The major problem with the AX37 Plus is that, like all other Pentium III DDR boards, it delivers a negligible performance boost over the existing SDRAM chipsets. It also represents a dead end on the upgrade path.

The board was tested using the Turbo Default settings in the BIOS and then compared to our Pentium III testbench. Unlike the 10% performance boost found on AMD DDR systems, the maximum variation between the AX37 Plus and our Pentium III testbench was 6% in the SiSoft Sandra2001 Float FPU tests. This can be attributed to several factors, most importantly the less-than-stellar performance of VIA's current DDR memory controller and the fact that the Pentium III does not take advantage of the extra bandwidth offered by DDR.

Performance aside, the board is stable, good looking and has a pile of added extras. But it's still hard to recommend a board that offers no significant performance boost and no upgrade path. ▢



The Pentium III is finally set to increase in speed over the coming months, starting with the release of a Coppermine Pentium III at 1.13GHz. The previous 1.13GHz version was marred by poor performance and overheating, which eventually led to a recall of the processor – something that Intel has finally managed to fix.

This will herald the end of the Coppermine Pentium III, and will be followed by the final appearance of the Tualatin, which will come in 1.13GHz and 1.26Hz varieties.

Unfortunately, the Tualatin uses a revised Socket called FC-PGA2, and is not supported by the current chipsets (however, reports suggest that the Tualatin will work with the decidedly old-school BX chipset). This means that there is no simple upgrade path from Coppermine to Tualatin. Most motherboard and chipset manufacturers are releasing new revisions to support the Tualatin. For example, VIA is releasing a range of chipsets using the suffix 'T'. For example, the Apollo Pro 266 will become the Apollo Pro 266T.

The Tualatin will only have a short lifespan, however, as the impending release of the Intel Brookdale SDRAM chipset for the Pentium 4 and the move towards a cheaper four-layer process for i850 motherboards lead to a drop in overall system cost for the Pentium 4. Waiting in the wings is also the DDR-based VIA P4X266 chipset, which Intel seems reluctant to license and VIA seems confident will be fine due to a complicated arrangement stemming from their purchase of S3's graphics division.

This threesome should be enough to push the Pentium III into obscurity and entrench the Pentium 4 firmly into the mainstream consciousness.

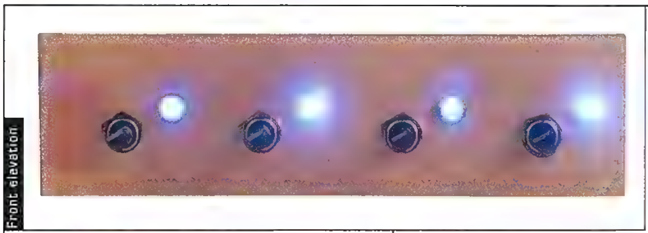
SPECIFICATIONS

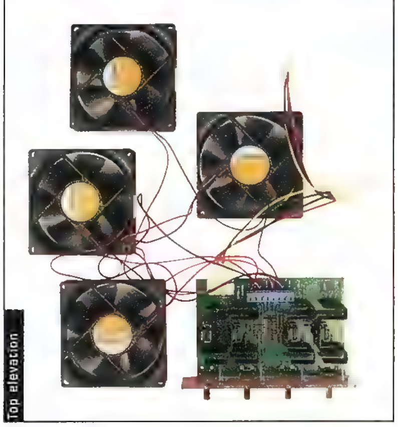
Intel PGA370 CPU motherboard, three 182-pin DDR RAM slots, AGP, six PCI slots, 4x ATA/100, IDE RAID controller, VIA Apollo Pro 266 chipset

Supplier: BBOS computers (02) 9211 2912 **Price:** $350

atomic
7.5/10

Rheobus





PC Mods want to make products that give your case 'the cool factor'. The Rheobus Kit by PC Mods certainly fits in that highly sought after 'Don't it look neat?' category.

This fan control unit sits in a 5.25in bay, with four aluminium knobs and four blue LEDs. Although installation is simple, it does require some work with a drill and, depending on what fans you are using, you may also need to do some wire stripping. The instructions enclosed are very detailed, but it's reasonably obvious what you need to do to get the unit up and running. Supplied with the kit is a template for modifying your own faceplate.

The LEDs glow brighter as you increase the power going to the fan(s) you are controlling. In fact, the LEDs are so bright that they could almost become distracting if you are working or playing in a darkened room.

If you need justification for a device such as this (apart from having some funky knobs and LEDs on the front of your case), then consider that all those fans you have probably don't need to be running at full tilt when you're checking your email or typing a letter to your grandmother. However, jump into some serious online fragging and you need all the grunt your fans can give. The Rheobus gives you that sort of control.

You can't actually turn your fans off, but being able to reduce the speed they're spinning at will generally reduce the amount of noise your fans generate. Even though the Rheobus has only four knobs, you can attach multiple fans to each knob. The rheostats used in the unit can handle large fans at up to 17W per knob.

Our only criticism here is the price. The device could be made from parts you can buy from any electronics shop, by anyone who is handy with a soldering iron, for a fraction of the cost. That said, the Rheobus performs its job well, looks fantastic and gives you more control over your fans than you ever had before.

SPECIFICATIONS

Four ultra-bright blue LEDs, cast aluminium knobs, terminal block for wiring, Molex connector for power. Supports up to three 120mm fans for each rheostat

Web site: www.pccasegear.com **Price:** $119

atomic
8/10

atomic HOT

TDK veloCD 241040

Over the past six months it seems that the bubble has finally burst in terms of CD writing speed. The increasing adoption of P-CAV (Partial Constant Angular Velocity) technology is allowing manufacturers to start ramping up the burn speed at a phenomenal rate. Last month TDK introduced its 16x veloCD, and only a month later the 24x model arrives.

The 24x veloCD is a pretty awe-inspiring beast. Combining 24x write with 10x rewrite and 40x read it is light years ahead of the competition. For now. Coupled with this speed, the drive also includes BURN-Proof technology to prevent buffer underruns. This feature is becoming more and more welcome with the high data transfer rates needed to keep the burn going at 24x.

TDK is incredibly focused on the audio market, and the packaging, design and software all reflect this. The drive comes bundled with Nero 5.5 and InCD packet writing software from Ahead. Also included is TDK's CD audio software, CD Blender, MUSICMATCH Jukebox 5.0 and Adobe ActiveShare.

We tested the drive on our Athlon testbench using Nero CD Speed 99 (www.cdspeed2000.com), the latest version of which copes with high-speed P-CAV burning. The data transfer ended at 39x and averaged 30x, and audio transfers averaged 24x using CAV. So ripping a 74-minute CD into WAV files translates to only two-and-a-half minutes.

The big question is how the drive performs during a burn. The good news is, it does burn at an average speed of 22.7x using P-CAV technology. The slightly lower average speed is a function of the P-CAV technology, in which the early data transfer is slightly slower as the drive speeds up.

TDK is making a big impact on how we look at CD burners at the moment. Its veloCD series is just getting better and better, and with the arrival of the lightning fast 24x burner all you have to worry about is going through those spindles of blank CDs too quickly.

SPECIFICATIONS

24x write/10x rewrite/40x read. Packaged with TDK Blender software, Ahead Nero 5.5 and InCD, Adobe ActiveShare, MUSICMATCH Jukebox and a CD marker pen.

Web site: www.tdk.com.au **Price:** $699

atomic
9/10

SyncMaster 170MP

Front elevation

Side elevation

In the eternal search for desk space, TFT LCD monitors are a tempting option. The SyncMaster 170MP from Samsung is an interesting twist on the plethora of single-function TFT screens around, taking a high-quality 17in TFT screen and adding speakers, a remote control, video inputs and a TV tuner.

This adds up to an intimidating package, but one that would still fall flat if the screen quality was poor. Thankfully, the screen used in the 170MP is crisp and clear, with decent refresh rates and an amazing 80° viewing angle (which means that you can see the screen clearly from almost side on).

We tested the screen using DisplayMate Multimedia Edition (www.displaymate.com), which contains a special suite of tests for TFT screens. The monitor excelled in the contrast and colour range tests, but there was some slight distortion evident in the geometry tests. The screen is capable of resolutions up to 1,280 x 1024 at 76Hz, and will run 1,024 x 768 at 85Hz. However the limitations of TFT do come across when playing games onscreen, with noticeably distracting motion blur occurring in fast-paced games.

The inbuilt TV tuner is simple to use; just plug an antenna into the socket in the back of the screen and then run an automatic channel search. There is also one S-Video and one Composite video input to plug in all variety of devices.

All this is packed into a very stylish silver monitor, with an accompanying remote control for more comfortable TV viewing. As an added extra, when the stand is folded back it becomes a carrying handle, which is perfect for people on the move.

With the SyncMaster 170MP, Samsung has been able to combine some of the best TFT technology with a pile of added functionality to create a monitor that begs to take pride of place on your computer desk, as long as you don't want to use it primarily for gaming.

SPECIFICATIONS

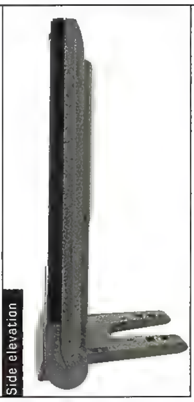
17in TFT screen, TV tuner, remote control, S-Video and Composite VGA inputs, Colorific software, maximum resolution of 1,280 x 1,024 at 76Hz

Web site: www.samsung.com.au **Price:** $3,950

atomic 9/10

AG Neovo

Front elevation


Side elevation

The most prominent feature about the Neovo is its glass face. This sits above the TFT screen and adds a level of protection to the screen that has been missing from TFT screens. This also telegraphs the fact that the screen is being pushed as a good option for public display, with the glass preventing damage from the probes and pokes of passers-by. The glass does, however, act as a highly effective smudge and fingerprint collector.

The glass covers an impressive 15in TFT screen, with a viewing angle of 75° degrees. This is rare in such a low-cost screen. We tested the display with DisplayMate Multimedia Edition (www.displaymate.com), and it excelled in all tests. Of special note was the geometry performance, which was one of the best we have come across.

Of course, by packing such a good-quality screen into such a low-cost monitor there has to be some sort of trade-off. This comes in the form of limited resolution support, with a maximum resolution of 1,024 x 768 at 70Hz. There is also noticeable motion blur when using the monitor for gaming. However, the relatively low refresh rate is fine for normal desktop tasks.

The Neovo also has a unique tilt function, which allows the monitor to be laid flat on a table and still display properly. This is good for those occasions when you want a large group of people to see what is onscreen. Apart from this and the glass cover, there are no other fancy features in the Neovo, with only one D-Sub VGA input.

If you want to take advantage of your new GeForce3 card, then TFT technology is still a poor second to good-quality CRT. But for a stylish and cheap solution for desktop use or public display, then the Neovo comes highly recommended. Just make sure you have a reliable supply of glass cleaner.

SPECIFICATIONS

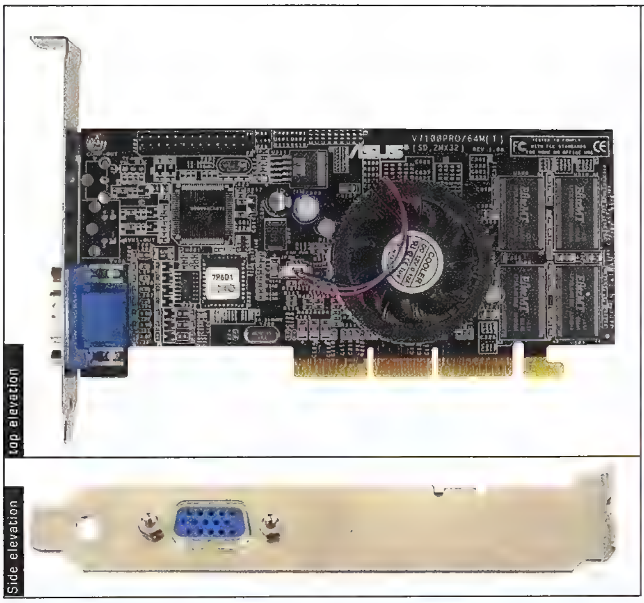
15in TFT screen, protective glass panel, 75° viewing angle, D-Sub connector, maximum resolution of 1,024 x 768 at 75Hz

Web site: www.camcom-international.com **Price:** $1,995

atomic 8.5/10

ASUS V7100 Pro

John Gillooly MXes business with pleasure.

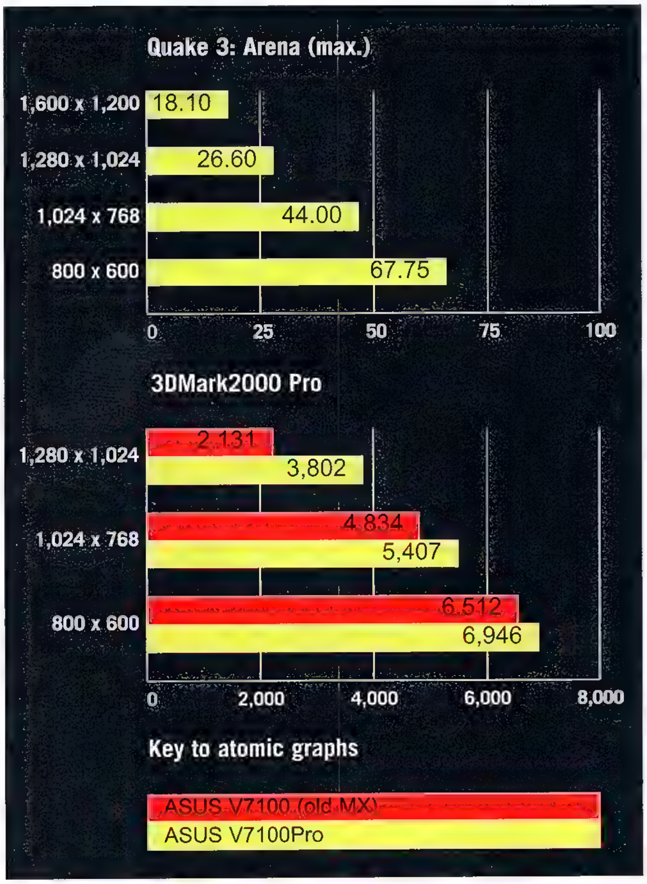


In the high-speed world of hardware, one often ends up reminiscing fondly about six-month-old products. Thinking back to the simpler days, one such case is when there were three video card options from NVIDIA: MX, GTS and Ultra. These times have passed us by now, and the sheer volume of variations on the GeForce2 has become overwhelming. This is especially problematic in the MX field.

Earlier this year NVIDIA decided to diversify its MX range into two streams: the MX200 and MX400. The MX200 is designed as a very low-end solution, with slower speeds and reduced functionality. The MX400 slots into the niche occupied by the old MX, and with its faster core and support for 64MB of RAM it is designed to slightly outpace the MX we used to know.

The major problem with this is that for the past few months it has been incredibly confusing trying to work out just what kind of MX a card is, especially in system advertisements that are already confusing enough with the focus on non-specific terms like 'NVIDIA graphics'. No longer does the term 'GeForce2 MX' have a degree of certainty behind it. For a while there were actually three separate MX chips: the older stock that was being sold off by manufacturers, the MX200 and the MX400. Add to that various combinations of memory size and the sense of confusion was great. Thankfully, things are quietening down, with most people realising that if a card has 64MB, then it is definitely an MX400.

> 'The MX400 slots into the niche occupied by the old MX . . .'



The V7100 Pro is ASUS' entry in the MX400 race. Both the core and RAM on the card run at 200MHz, which is a leap over the 175MHz core and 166MHz RAM on the old MX cards. This difference in operating speed translates to a slight boost in performance over the old MX.

We tested the card on our Athlon testbench and compared the 3DMark2000 Pro results with the ASUS V7100, which uses the older MX core. The graphs show that the added speed of the V7100 Pro makes running at 1,280 x 1,024 a much more viable option, with great performance at 1,024 x 768. At lower resolutions the two cards stay neck and neck. The difference is largely due to the faster core speed of the V7100 Pro. However, at 1,280 x 1,024 the gap starts to increase dramatically as the much faster RAM speed kicks in on the V7100 Pro.

With a black PCB and a rounded silver heatsink, ASUS has again managed to combine good styling with great performance and an extensive software bundle, making for a very attractive budget video card with the ability to clearly outperform it's lower speed predecessor. ▢

SPECIFICATIONS

MX400 GPU, 64MB 128-bit SDRAM, D-Sub output, bundled with ASUS DVD, Messiah, Star Trek New Worlds and 3Deep colour calibration software

Web site: www.cassa.com.au **Price:** $249

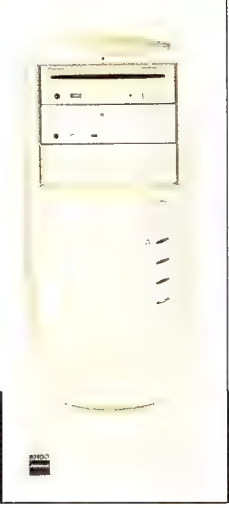
atomic
8.5/10

Emagen Vitesse 1400DDR+

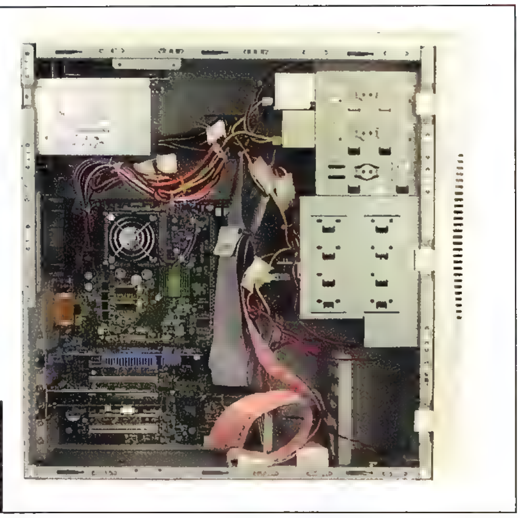
atomic HOT

David Kidd's you not – this thing honks.

Front elevation



Front elevation



Side elevation

Before we start, let's just say that as a general rule, atomic doesn't do systems. That said, the latest offering from Emagen makes it into our holy text because, quite frankly the Vitesse 1400DDR+ is a maximum power computer. The Vitesse 1400DDR+ is a gaming system, proving that Emagen is listening to what we need rather than informing of us what we want. The system contains everything we here at atomic have praised through the year, so let's take a recap.

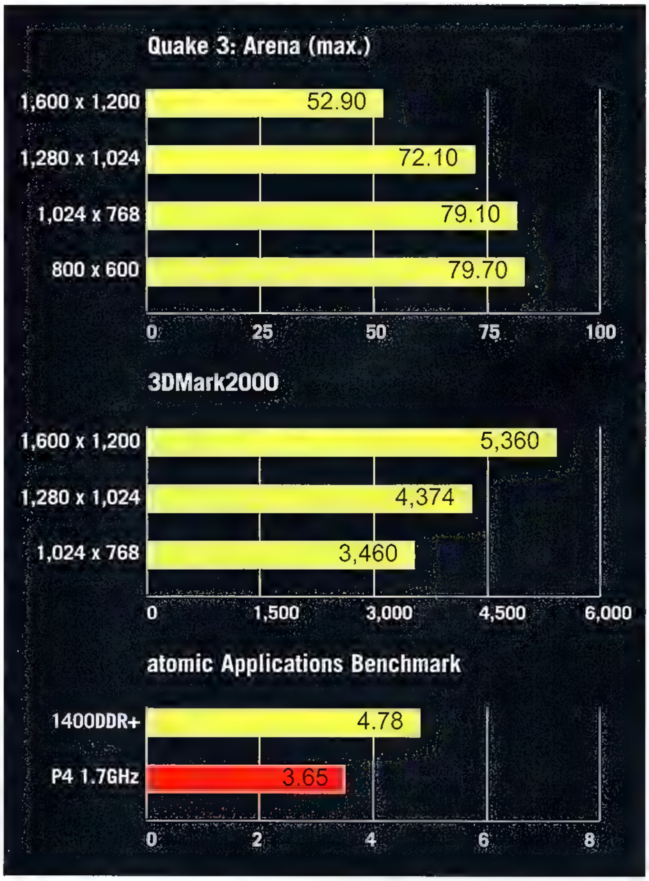
First and foremost, the Vitesse 1400DDR+ is powered with a 1.4GHz Athlon and 256MB of PC2100 RAM. This all sits atop the MSI K7 Master-S motherboard, which, like the ASUS A7M266, uses an AMD/VIA hybrid chipset. The Northbridge is the superior AMD 761 chipset, while the Southbridge is the VIA VT686B. To cool the beast, Emagen has included the noisy yet powerful successor to the FOP 38, the GlobalWin WBK38 HSF. Further cooling is supplied by an 80mm rear case fan.

In addition to the meaty engine, the Vitesse 1400DDR+ packs the hefty Hercules Prophet III GeForce3. To speed things up further, Emagen has also included an 18GB Seagate Cheetah through the onboard SCSI controller. All this makes an impressively speedy system with high-end gaming in mind.

In keeping with a commitment to quality, the Philips Brillance 109P is an astounding piece of pixel magic. A professional-level monitor equalled only by Sony and capable of resolutions up to 19in. We gave Hercules GameTheatre XP a glowing review and it's a refreshing change from the dominating Creative product line. The Altec Lansing ADA890 4.1 speaker set further extends the already impressive audio capabilities.

The 3D performance benchmarks were impressive, but we were blown away with the atomic Applications Performance results. We have yet to see a score this high in the atomic Labs without tweaking.

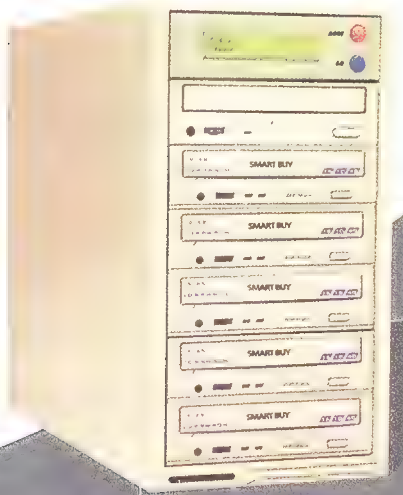
Emagen's latest monster embodies the latest high-powered consumer technology currently available, and each component has mostly been recognised by atomic as the best around. We may wince at the price, but in the end, only various expletives can fully describe it. That's a good thing.



SPECIFICATIONS

Athlon 1.4GHz, 256MB PC2100 DDR SDRAM, MSI K7 Master-S mobo, Hercules Prophet III, Seagate 18GB SCSI hard disk drive, Pioneer 16x DVD, Hercules GameTheatre XP **Web site:** www.emagen.com.au **Price:** $5,699

atomic 9.5/10



5 CDs under 5 minutes

Fast speed 16x

stand-alone

1 to 5 CD

duplicator system

1. Stand alone all-in-one CD duplicator - no PC required! for operation
2. True 16x speed CD-R writing - fast, stable!
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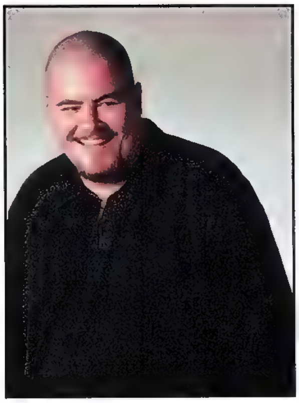
There's grass on them thar hills



There are so many 'Holy Grails' of gaming. Depending on who you talk to and what genre they like there are many different things they want from games, from the tangible to the intangible and varying between the realistic and the unrealistic. These expectations are a major driver of the feature creep that has delayed so many expected titles.

One of the big things that I have been looking for is realistic terrain. Not highly detailed corridors, but big, authentic-looking outdoor environments. These sort of environments have been stalwarts of some game series such as Tribes, Terra Nova, Delta Force and any Giant robot games, but they have all had their limitations. Similarly, some genres, such as real time strategy, have been taking advantage of terrain differences and true line of sight for some time. However, the first person shooter genre has largely been focused on creating believable indoor environments, not outdoor. Even when outdoor environments are introduced they are little more than corridors with rock walls and no roofs.

Operation Flashpoint takes these outdoor environments to a whole other level. There is a certain sense of awe that comes over you when you first stand on the edge of a cliff looking out at the tree-filled valley below, or when you slowly creep along a gully line to avoid detection by passing patrols. This combines with a proper contour map and compass to make the terrain become a major factor in all the in-game decisions. Rather than take the most direct route to your objective it often pays to circle around to take the high ground, or to place key members of your squad such as snipers and anti-tank soldiers in appropriate positions.

Hard to handle

One of the major limitations on big outdoor areas has been hardware. Once you start throwing huge draw distances and complex terrain the hardware load shoots through the roof due to a variety of factors, especially overdraw. This leads to the infamous pop-up of days gone by. Take big complex terrain and add a whole pile of trees, buildings and vehicles and you have something that can hit your PC with a fairly hefty load.

This involves compromise, something that Flashpoint has achieved by using simple sprite-based vegetation. This translates to some fairly ugly screenshots, but once you move over a hill and start advancing towards enemy positions the level of immersion is so great that the ugliness of each individual tree and bush disappears completely.

The introduction of such extensive vegetation is a bold move, but one that works beautifully, unlike NovaLogic's uses of Voxel-based grass in the Delta Force series, which made the whole environment shimmer with fuzzy hills.

Tribes 2 is another recent release that makes good use of open terrain albeit it in a different way. The Tribes 2 approach has minimal vegetation, but does include rivers and lakes, which have been omitted from Flashpoint due to design considerations. Tribes 2 has suffered from the problems involved with overdraw (which has been the focus of a gradual trickle of patches over the past months) and has nothing like the viewable distances of Flashpoint, but achieves similar heights. Just as teamwork is essential, so is correct use of terrain for concealment, tactical advantage and even quick movement.

When he returned from this year's E3, Ben remarked that it was shaping up to be the year of bumpy terrain and sniper zoom. Early screenshots of games like Halo, Unreal II and Planetside demonstrate this commitment. Of all the upcoming games, Planetside looks most exciting with its employment of outdoor areas. The use of vegetation in Planetside is light years ahead of that in Flashpoint, with much smoother trees and a bigger variety of scrubby stuff. This adds so seamlessly to the overall look of the game that it has helped to make people suddenly start standing up and taking notice of this upcoming release.

Unreal II, which comes straight from the very traditional corridor-based shooter heritage, exploded onto the scene accompanied by a few screenshots that displayed wide-open areas. It remains to be seen whether these areas are actually playable environments or just eye candy, but it is looking very nice indeed.

The future of outdoor environments is looking incredibly rosy. As processing power increases and features like DirectX 8.0 shaders come into play, more and more possibilities are emerging. We are still a long way from seeing games that look like the 3DMark2001 nature demo, but game development is moving in that direction at a remarkable pace.

John Gillooly

Operation Flashpoint: Cold War Crisis

Des McNicholas reports in from deep behind enemy lines.

ⓘ The engine used for Operation Flashpoint scales beautifully between broad range aerial combat and gritty on the ground combat

Operation Flashpoint: Cold War Crisis has been right up there in the most-wanted stakes for some time now. Czech developer Bohemia Interactive Studios promised an intensely realistic simulation of 1980s' East versus West warfare, drawing on the development team's own army experience. They've got good memories, because Flashpoint does a remarkable job of capturing the essence of military operations from the perspective of the individual soldier, and wraps the action up in a credible operational picture. Individual aspects of the game could do with some work, but the overall experience is worth the odd glitch, and Bohemia's approach has a satisfying ring of truth about it.

Flashpoint takes us back to those halcyon days when we thought Ronald Reagan would push the button if he could just manage to find it. It's 1985, and Gorbachev has seen Communism off and started to introduce his wide-ranging reforms. The only problem is that some renegade Russians have decided to oppose the change. Their forces have moved against a fictional group of islands, and NATO has decided to get them back. It's a very credible scenario, and no doubt one that exercised the minds of Western leaders at the time. Starting out as a private in the US Army, players have the opportunity to progress to squad command through a series of challenging missions, with access to a wide range of weapons, vehicles and aircraft. The sheer scale of the game is impressive, incorporating FPS and squad tactics, huge open terrain areas, and elements of vehicle, tank and flight simulations.

New recruits are presented with the option of 11 single missions, a mission editor, multiplay via LAN or Internet, and a campaign that includes some limited training. Fortunately, the small number of single missions isn't too much of a problem because the mission editor is well designed and simple to use, producing some first-class, homemade scenarios. Ultimately, a good editor also means that the Internet will be full of player-generated scenarios that add to the life of the game, and introduce some interesting variations on the theme. We were unable to test the multiplay at the time of writing but GameSpy Arcade will provide support for competitive and cooperative play. We'll keep you posted on developments.

Flashpoint's campaign is well structured and presented, playing out as more than just a series of missions. It kicks off with an unavoidable mini-tutorial in which players are part of a squad being put through its paces on the obstacle course and rifle range, and culminates with a warning order to go into action. In a surprising early weakness for the game, the tutorial is below average, despite being supported by good cut scenes and a solid attempt to portray the training as part of the overall story. While a simple interface and various in-game prompts make it possible to pick things up on the fly, a couple of superficial running, crawling and firing exercises just don't make an adequate tutorial. Bohemia should have taken the time to cover other weapons such as grenades and rocket launchers, the basics of navigation, and vehicle and flying skills.

The campaign itself is fast paced, challenging and realistic. This is war from a soldier's viewpoint, and the feeling of being at the mercy of events is palpable in the early missions. The squad leader imparts the basic information needed to let players act as part of the team, after which things tend to crack along at a fair old pace. Players will often be running just to keep up as the squad moves to board vehicles or takes up position for an assault, and the picture of what's happening will usually be incomplete – particularly once the shooting starts. Fortunately, situational awareness is helped by leader and objective onscreen markers that keep players moving in broadly the right direction. The objective marker is particularly useful, as it changes to reflect different stages of the mission – much like the waypoint marker in a flight simulation.

Flashpoint handles squad engagements very well indeed, but some missions rely just as heavily on individual infantry skills and initiative. Events can change very quickly, with seemingly simple missions developing into a number of complex stages, promised support failing to appear, and enemy forces proving far more formidable than expected. At times, it's just a matter of surviving until the squad can

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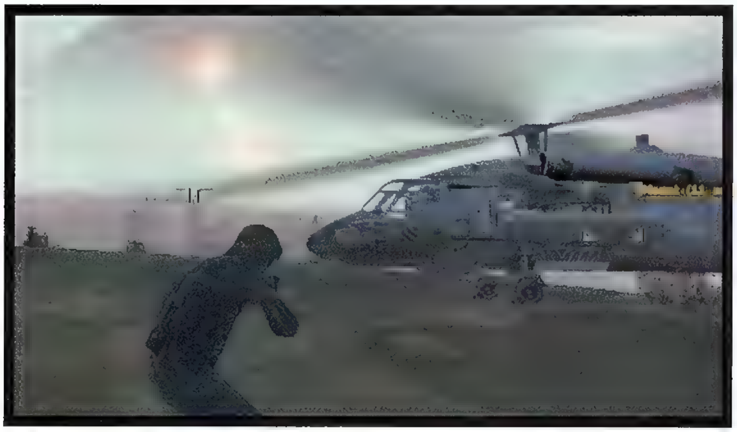
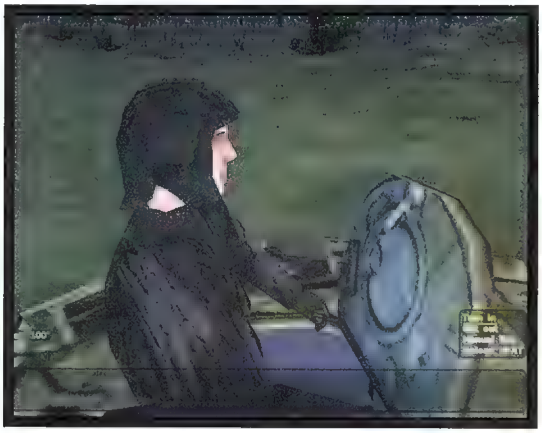
be rejoined or a rescue force arrives. The range of missions is well conceived, comprising everything from stealthy ambushes and frontal assaults, on through to armoured and airborne operations. Although voice-acting Oscars are unlikely, reasonably well-animated cut scenes keep things moving along, resulting in a story that hangs together a little better than most military titles.





LEFT: There is nothing more relieving than the sight of your Blackhawk pick-up arriving just after a heated battle. RIGHT: A nice touch with the tanks is the ability to 'turn out', open up the hatches and feel the wind in your hair.

Friendly AI is fairly good, with squad members reacting appropriately to changing circumstances, and calling out necessary information during firefights. They're perhaps a little too aggressive in the early stages, leaving new recruits in the dust while they carry out the proper contact drills, but it does serve to add to the excitement levels. The feeling of being part of something larger is heightened by missions that involve support from other squads or units outside the player's direct control, all of which are well orchestrated in accordance with the plan. If the briefing says that another squad will provide fire support, you can expect it to start up on time and from the intended direction. Pathfinding also seems okay, and squad members respond appropriately to orders – provided they're not wounded or terrified.

The enemy AI isn't quite as bright, particularly at short ranges, but it can still offer unpleasant surprises from concealed snipers or through the fast dispatch of reinforcements. Perhaps realistically, the enemy is a mixed bag; at times you'll be taken out by a single shot from a soldier with better tactical skills than your own, while on other occasions their skills are so poor that they're spotted a mile out. Enemy soldiers generally react appropriately once targeted, sprinting for cover rather than charging on in. Very few of the campaign missions are simple, with an easy approach to the objective often balanced by a tough fight to get out again. The rebels take a while to react, but don't mess about once they get going.

Keeping control

Getting the interface right in a game that tries to do so much is tricky, but it works well in most areas. Broadly speaking, the same key combinations are used for foot, vehicle and air movement, although the effects of getting it wrong are understandably more marked at 500ft! Similarly, firing commands are simply controlled via the left mouse button, regardless of the weapon. The right button is used to lock targets for smarter weapons. Onscreen reminders explain the use of various keystrokes, and players in vehicles or aircraft have the option of letting another crew member act as the gunner while they concentrate on driving, flying or lining up the target.

Other actions, such as picking up items or entering vehicles, are prompted onscreen by a context-sensitive action menu, and initiated by a mouse-wheel click or the Enter button. The range of actions available varies with the stage of the mission, and the nature of the vehicle, aircraft or weapon involved. Typical options include collecting weapons and stores from casualties or supply dumps, setting charges, engaging aircraft autopilots and opening doors. If all else fails then players can even shoulder their rifles and salute! Once the dizzy heights of squad command are reached, situational awareness is achieved via a special command view, and a range of simple predetermined orders can be issued quickly using the keyboard.

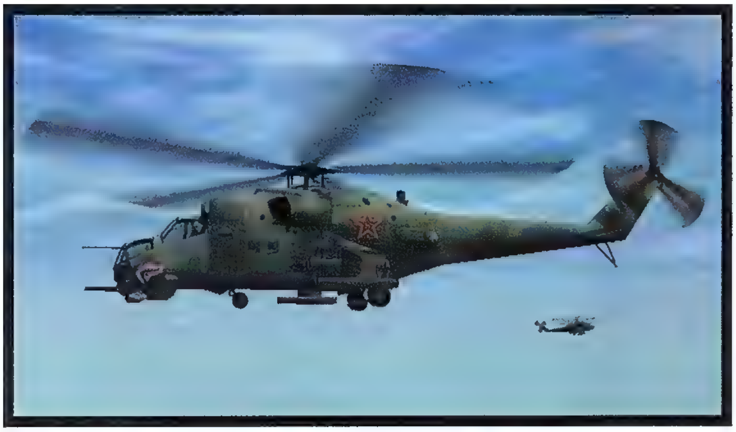
Flashpoint's realistic approach to weapon effects has major implications for both killing the enemy and staying alive. Quite rightly, small arms are largely ineffective when the firer is moving or unsupported, forcing players to continually search for good, stable firing positions. Similarly, maximum use of cover or stealthy movement is essential to avoid becoming a target, and it's in this area that the game poses

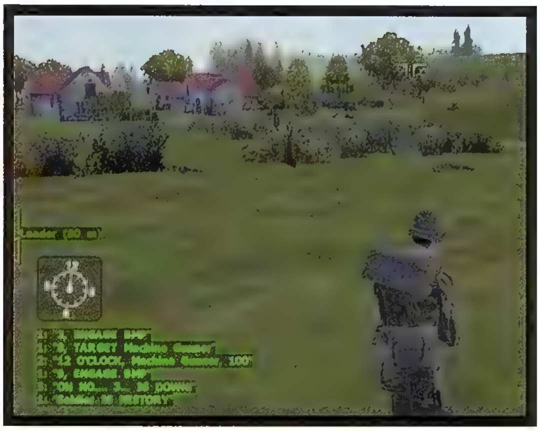
State of multiplay

While Operation Flashpoint has now been released in Europe and Australia, it is not due for a US release until September. This is mainly so Bohemia Interactive can add dedicated server support to the game. Currently, the multiplayer in Flashpoint uses peer-to-peer connections, where one person sets up the server, waits for others to join and then starts the game. This method is common; however, the dedicated server method used by the Quake series of games is much more user-friendly, allowing people to join and leave mid-game as well as allowing for more players.

Never fear, though, the dedicated server is scheduled to be released in patch form for the European (and Australian) version. Alongside this are a pile of new missions and vehicles that will also be appearing over the next few months in patch form. Keep an eye out for them at www.flashpoint1985.com.

some real challenges. The upshot of all this is that getting to the action is a little slower than the standard FPS, as players employ stealth rather than stun grenades. But the overall experience is far more challenging and satisfying. A time acceleration feature has been included for those that just can't wait, although the limitation of one save per mission means that players will need to be very confident about using it. To make things a little easier in such a dangerous environment, players can choose between first and third person views, both with a zoom function, while a weapon iron sight view is available for difficult shots.





The opportunity to control vehicles and aircraft has been a big selling point with Flashpoint, and several missions give players the chance to try out their skills. Ground-wise, a variety of jeeps, trucks and tanks can be taken for a spin, while winged warriors can have a crack at four different helicopters (including the Cobra and the Hip), an A10 Thunderbolt and a Cessna. There's even a couple of small boats for the nautically minded! The interface for each is quite straightforward, and players will have little difficulty mastering the basics. Consequently, those hoping for detailed simulations will be a little disappointed, although they will also be missing the point. The chance to drive, fly or sail is essentially a means to an end in the missions concerned, providing an interesting experience along the way, additional firepower and more options for the player. Mixing troops with wings or wheels is a big ask in any game, and Bohemia has done a far better job than most.

Big and beautiful

Flashpoint adds to the atmosphere by generally looking and sounding great, although minor deficiencies become apparent at times. Most notably, and despite needing a fair whack of processing power, the terrain that looks so good over a distance is a little blocky up close. Given that so much of the game is spent on the ground hiding behind shrubs or walls, it's quite noticeable and occasionally effects visibility and movement. Conversely, buildings, people and vehicles are exceptionally well modelled, as are weapon effects and general movement. The good visuals are supported by first-rate sounds right across the environment. Footsteps, rustling bushes and the effects of exertion all sound realistic, as do weapons, vehicles and aircraft. The music is also above average, particularly during the cut scenes, adding suitably to the rising sense of tension. The only real sound problem lies in the character speech, which just seems poorly recorded at times.

Flashpoint has delivered on most of its promises, by combining an innovative approach to FPS action and a credible big picture. It has very high production values for the most part, and makes a good fist of combining foot, vehicle and air operations. While simulation purists won't be wholly satisfied with the result, Bohemia's approach captures the general feel of vehicle and aircraft control, while focusing on the main game of infantry tactics. The surprising deficiencies are not critical to the package, and they are largely offset by a simple interface, a good range of onscreen prompts and an excellent campaign. Terrific as the single player game is, and despite a first-rate mission editor, Operation Flashpoint: Cold War Crisis will stand or fall on its multiplayability. At this stage, things are looking very good indeed. ▢

ⓘ LEFT: The nastiest helicopter in the skies, the Mi-24 Hind gunship will have you diving for cover at regular intervals. RIGHT: You'll spend a lot of time catching up with the squad, and it's a good idea to hit the ground with them. Staying in formation is tricky, but the third person view gives you a reasonable idea of what's happening.

GAME DETAILS

FOR: Great mix of FPS and mission-based action, realistic approach to military operations and an excellent mission editor. Very cool anti-piracy feature.

AGAINST: Very average tutorial, only one save per turn, slow load times and slightly garbled speech.

MINIMUM REQUIREMENTS: Pentium II 400MHz, 64MB RAM, 450MB hard disk space, 16MB Direct X-compatible video card
RECOMMENDED: Pentium III 600MHz, 128MB RAM, 32MB video
SOUND APIs: DirectSound
VIDEO APIs: Direct3D

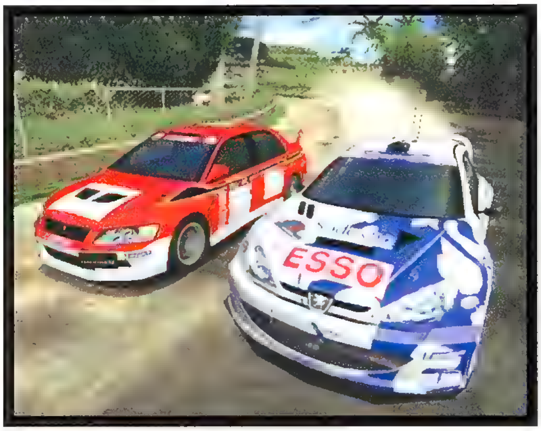
DEVELOPER: Bohemia Interactive Studios
www.bistudio.com
PUBLISHER: Codemasters www.codemasters.com
DISTRIBUTOR: OziSoft www.ozisoft.com.au

atomic
8.5/10

Gran Turismo 3 A-Spec

The PlayStation2's potential explodes all over Kevin Cheung's happy face.

ⓘ There are less cars in Gran Turismo 3 than it's predecessors, but the incredibly detailed car models more than make up for this.



Words cannot describe the anticipation that has been riding on Gran Turismo 3 (GT3) A-Spec. Its first two games on PlayStation were so great a phenomenon they gave new meaning to the way we thought of video game blockbusters, and reshaped the games market landscape. So to report that developer Polyphony Digital has surpassed expectation – it has absolutely nailed it – and that GT3 is the game that will sell a million PlayStation2 consoles – is a source of excitement and tremendous relief. And as a gaming fanatic, all this writer can think is, 'I can't wait for you to see this'.

Hammering down on the throttle exposes a redefined sensation of power and speed as you go balls to the wall with engine revs and suspension jerks at each gear change, and deliver 60 unfettered frames per second of wind, rain, dirt and exhaust in your face. Hearing your car tear through the airstream, the turbo charge kicking in as you power down the straight and a thumping soundtrack leaves you feeling nothing less than indestructible.

Running at high resolution with virtually no shimmering or aliasing, GT3's special effects – heat haze, wet tracks and clouds of dust that get kicked up in the air – are an absolute visual delight. By day, rays of brilliant sunlight stream over the horizon and peer through the canopies of trees, bathing the roads and rock surfaces in its yellowish glow and casting realistic shadows against the urban concrete and asphalt. At night the focus is on the mesmerising ballet of red, white and yellow as streetlights and brake lamps dance across the screen.

The replays are even more satisfying to watch. They feature a full set of options, allowing the camera to focus on individual cars or automatically zoom in on the best action. Polyphony Digital has also implemented motion blur, soft focus and a number of effects that solarise the image, or shift the colour balance to red, yellow or blue. The end result is unexpectedly realistic, and could easily be mistaken for live footage.

Interestingly, in GT3 one's sense of immersion into the sights and sounds of motor sports is as much a tactile experience as it is a visual and sonic one. The subtle vibrations of the Dual Shock 2 control pad accurately emulate every minor contact and collision. Even more impressive are the engines of individual cars; you can actually feel the engine rumbling in your hands. When you use a Dodge Viper for the first time to catch up to an NSX on the straight and peel past it on the corner, you'll have a new appreciation for why some cars are better than others.

It's gets better, though. In conjunction with Logitech, Sony is releasing a force feedback steering wheel that connects to one of the PS2's USB ports. It's modelled against Logitech's Formula GP line of wheels, and is equally pricey at $250 a pop. Some fans will no doubt see this steering wheel as an essential purchase, as it accurately emulates the forces acting on your wheels from over-steering, counter-steering, skidding, and so on.

GT3 is structured like its predecessors. The arcade and simulation modes share tracks that take you through winding city blocks, lush country circuits and dirt tracks specially designed for rally racing. Simulation mode puts you through the familiar motions of entering races, winning prize money and using those earnings to purchase vehicle upgrades and more powerful cars. There are about 150 cars (much less than the previous game), but the tradeoff is a higher polygon count that makes them look strikingly real.

One could criticise GT3 for not being that different to its predecessors, but that's the nature of any sequel. GT3 improves the racing experience beyond anything we've seen before. One gripe is that the game features a catch-up advantage for anyone coming second in two-player mode, and there's no option to switch it off. Considering how well polished and executed the rest of the game is, though, it's a flaw worth learning to live with. ▢

GAME DETAILS

FOR: Exquisite visual beauty, supplemented by an equally impressive usage of sound and control.

AGAINST: Game structure hasn't been greatly improved upon.

MINIMUM REQUIREMENTS: Dual Shock 2 control pad, 8MB memory card
RECOMMENDED: GT Force steering wheel

DEVELOPER: Polyphony Digital www.polyphony.co.jp
PUBLISHER: Sony www.au.playstation.com
DISTRIBUTOR: Sony au.scee.com

atomic
9.5/10

Half-Life: Blue Shift

Aliens and government soldiers drag David Hollingworth back to the Black Mesa. Again.

Half-Life – one of the greatest games of all time. Team Fortress Classic – building upon the then excellent Half-Life engine to bring a great Quake classic to a new audience. Half-Life: Opposing Force – a reasonably good game, with new twists on the old tale, some new enemies and enough old-school fun to remind you why you liked Half-Life in the first place. And now, sadly, we have Half-Life: Blue Shift, which only reminds you how old the engine really is.

> '. . . the grunts are still one of the toughest oponents you are likely to come across in a first person shooter . . .'

And that's a shame; I want my memories of Half-Life to remain unsullied. But it seems Valve is not the kind-hearted games house we first thought it was. If it were, it would leave Half-Life alone and get on with bringing us Team Fortress 2, a game that we all want to see far more than we do rehashed versions of a two-year-old title. Though, truth be told, Blue Shift is put together by Valve cronies Gearbox Software, the makers of Opposing Force.

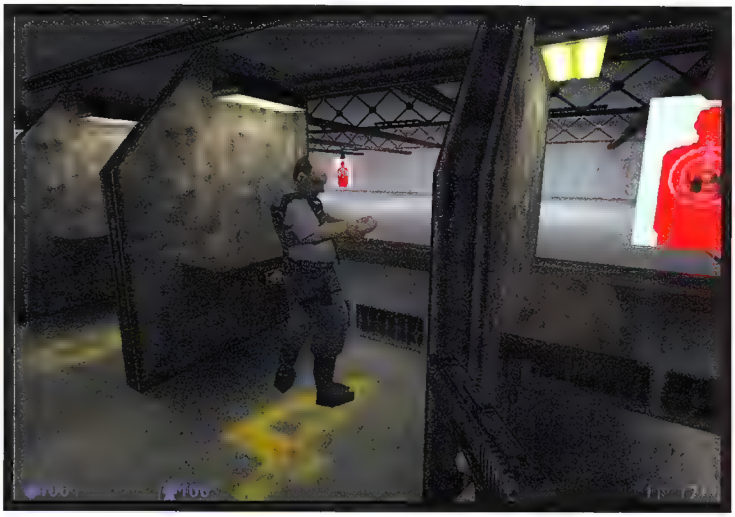
The premise of Blue Shift is simple. Remember all those guards that run around the Black Mesa Research Center, gifted by fans with the collective moniker of Barney? Well, in Blue Shift you play one of them, and you are assigned to guard a critical part of the underground facility. Then, all hell breaks loose – never saw that one coming – and you get to lay a semiautomatic smack-down on aliens and grunts for about seven hours worth of gameplay. Interestingly, the intro actually casts you as one of the many odd things that Gordon Freeman, the hero of the original game, glides past on the way to work. In fact, about the most fun you can have in the game is working out where you fit into the original Half-Life tale.

The rest of the game is pretty plain. Unlike Opposing Force, there are no new aliens, weapons or creatures to come across and blow away. There are some well-scripted scenes, particularly those when the best bad guys from Half-Life, the Special Forces soldiers tasked with 'cleansing' Black Mesa, burn their way through a locked door to get to you. Truth be told, the grunts are still one of the toughest opponents you are likely to come across in a first person shooter, but they alone do not make an adequate game good.

The only vaguely new thing in Blue Shift is the High Definition pack, which updates some of the models from the original with newer, better looking graphics. You also get TFC and Opposing Force, but if you're a fan, chances are you have them already, in which case you're paying $49.95 for a few hours of gaming that is eerily familiar. Sure, there's the odd fright from a headcrab leaping out at you from an airconditioning duct (yes, the sequences in Xen are still creepy), but we've seen it all before.

Perhaps it isn't all Gearbox's fault. Blue Shift was originally meant to be a console title, and as such it might have brought fresh gameplay to a whole new market. That particular project was scrapped, however, and the developers had a near-complete game on its hands. I can imagine that, for a games company, some money from a less than great game is better than no money from a dead project. So there's really nothing to lose.

Except, like a drunken 16-year-old during Schoolies Week, their self-respect.



ⓘ The security guards in the Black Mesa facility engage in a little donut quick-draw competition.

GAME DETAILS

FOR: Like an old pair of sneakers – comfortable and easy to run around in.

AGAINST: Also like an old pair of sneakers – the smell is beginning to get a little . . . old. A new pair of sneakers (TF2, anyone?) would be great.

MINIMUM REQUIREMENTS: Pentium 133MHz, 24MB RAM
RECOMMENDED: Pentium 166MHz, video card
SOUND APIs: DirectSound, EAX, A3D
VIDEO APIs: Direct3D, OpenGL

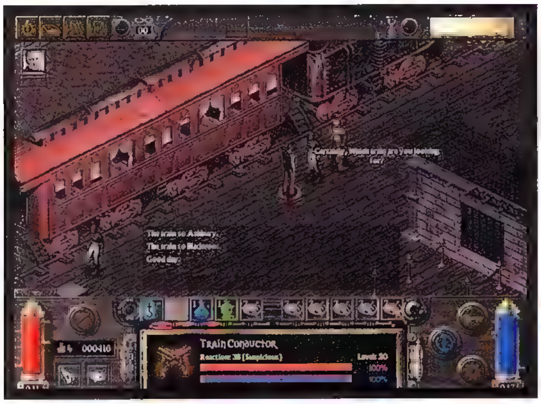
DEVELOPER: Gearbox Software www.gearboxsoftware.com
PUBLISHER: Valve Studios www.valve.com
DISTRIBUTOR: Vivendi Universal www.vivendi.com

atomic
6/10

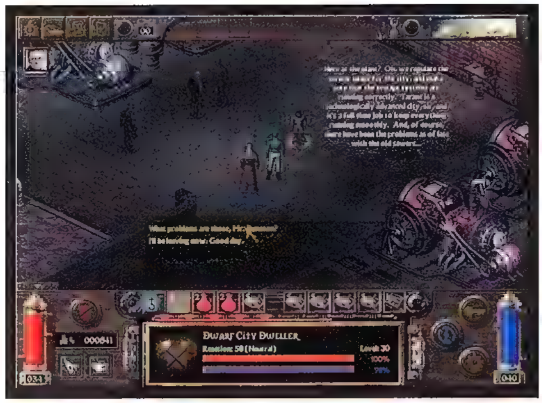
Arcanum

atomic HOT

George Soropos plays only the finest RPGs.



One thing that has been missing from traditional RPGs is the humble train conductor, whose evil skills cannot be talked about by mere mortals.



The fusion of the magical and the technological is a central part of Arcanum; power plants sit happily alongside potions and spells.

Tim Cain was one of the key people involved in the development of Fallout and Fallout 2, two of the most loved and replayed RPGs ever made for the PC. So when his new team at Troika announced Arcanum, it justifiably created a bit of excitement in the ranks of true RPG gamers everywhere. The game has lived up to expectations and then some.

Imagine the world of J. R. R. Tolkien, of AD&D, but far in the future relative to the eras we normally associate with these worlds. A time when technology is emerging and competing side by side with magic, when steam trains and swords, firearms and spells coexist and the world has to deal with both forms of power. Intriguing, original and a great part of Arcanum's charm.

Arcanum is a deep RPG. Some RPGs operate more like quality control software for mouse manufacturers. If they had instructions they would read like this: point and click, then repeat a billion times until end of game. Arcanum is not one of these games. The complexity, choices and possibilities offered to the player in the game set it apart from anything made before. The world has been designed to be the most open-ended and replayable ever. And there are so many character development options that each time you play you can do things very differently. Choose the path of technology or magic for your character, or try to sit on the fence. There are so many choices on your character sheet that it becomes a bit bewildering when you level-up. Each level gives you only one or two points to add to a selection of over 40 possibilities including your personal ability stats, spells, varying technical disciplines such as explosives or traps, combat skills . . . it's a long list. In short, you can customise your character in an unprecedented way, and the game has enough depth to allow you to use whatever tactics and abilities you decide to develop.

The game's overhead map allows you to set waypoints, making long walks easier to deal with, and long-distance travel is handled on a larger world map in a similar way to the Fallout games. The gameworld is vast and there are many little nooks and crannies to be uncovered as well as many towns and cities. The urban areas in Arcanum are full of life and rife with quests ranging from the usual to the bizarre – some of them are almost a game unto themselves.

One of the most impressive features of the game, however, is entirely separate to it. Arcanum comes complete with the entire development kit that Troika used to make it. To our knowledge this is the first time in history that this has been done. There have been map editors before and even limited campaign designers, but not like this. With enough time and dedication anyone can remake Arcanum into whatever they want, and that bodes very well for the game's replay value and creative potential.

Arcanum does have a few flaws. Your party members are handled in the same way as in Fallout; that is, you cannot equip or order them directly. You can tell them how far away to stand and that's about it. As a result they get killed more easily than they should and require a bit too much handholding by the player. The only other annoying thing is the inventory. Due to the mass of components available for making potions, weapons and other doodads your pack quickly fills up with all sorts of stuff, and you're always having to make decisions as to which things you're going to drop to make more room. ▢

GAME DETAILS

▢ FOR: Deepest RPG of all time, great gameworld, awesome replay value.

▢ AGAINST: Detail can be bewildering, primitive party management.

MINIMUM REQUIREMENTS: 266MHz CPU, 64MB RAM, 16-bit DirectX 7.0a-compatible video, DirectX-compatible audio
RECOMMENDED: 800MHz CPU, 128MB RAM, 64MB video card
SOUND APIs: DirectSound
VIDEO APIs: None

DEVELOPER: Troika www.troikagames.com
PUBLISHER: Sierra www.sierra.com
DISTRIBUTOR: Vivendi Universal www.vivendi.com

atomic
9/10

Emperor: Battle for Dune

Like sand through an hourglass, George Soropos rains on Westwood's parade.

Here it is at last: Westwood's 3D RTS. This was supposed to be the game that pushed Westwood forward, returning it to the cutting edge of RTS game design after years in the 2D wilderness. Sadly, Westwood have again produced a dated, dull and lifeless product – one that retains none of the original Dune II's addictive and, fun and enjoyable gameplay.

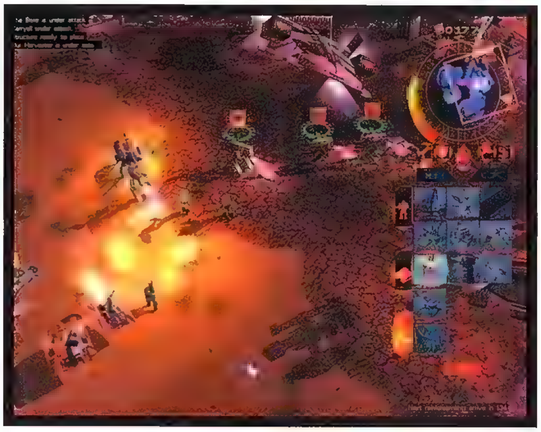
Emperor is certainly the most attractive 3D RTS around. The graphics engine is pin sharp with some very nicely modelled buildings and units. Unfortunately, when it comes to actual gameplay the engine is a sham. It isn't really 3D, it's just Westwood pulling your leg. Total Annihilation was a more genuine 3D RTS than Emperor will ever be.

While Emperor's graphics are in glorious 3D the mechanics of the game seem to only run in 2D. Placing units on hills provides no advantage whatsoever; they do not shoot further, nor are units penalised for attacking from lower to higher ground. Radar is not blocked by terrain higher than the radar source as it is in genuinely advanced 3D RTS games such as Moon Project. In short, Emperor is a 2D game with a 3D graphics engine.

Westwood has at least included some interesting new unit types, along with a few classics like the Atreides Sonic Tank. The Ordos Eye In The Sky airlifts saboteurs and drops them off anywhere you like – directly over an enemy base, for example. Most of the really good ones don't belong to any of the three main houses, however, and are available as sub-house units as you make alliances with these groups during the game. What they haven't included is any kind of sophisticated AI to automate some of your units' actions; the mechanics of controlling your characters is essentially the same as it was in Dune II.

Over the years Westwood's designers have tried various ways of encouraging players to make more use of infantry, and they have continued this philosophy into Emperor. In Red Alert 2 they used buildings and in Dune it's Infantry Rock. Infantry Rock can only be used by infantry and provides strong cover, ideal for setting up ambushes. Unfortunately, the designers have also included vehicles that are so effective against grunts that they have defeated their own goal of making the infantry more useful. So we have yet another Westwood game in which nearly half of the available units are practically useless. Brilliant.

The only interesting aspect of Emperor is the persistent and dynamic single-player campaign map. Missions do not flow sequentially, rather they're part of an ever-changing tactical environment where your success and resources affect how the overall campaign plays out. The only real innovation comes in the form of Emporer's alleged 155 built-in single-player missions. We haven't had the opportunity to see them all, obviously, but it's about time someone moved away from the standard 30 missions!



The graphics in Emperor may be 3D, but the gameplay certainly isn't.

There is one final insult waiting to be hurled at Emperor, its poor multiplayer balance. You'd think a developer with Westwood's experience would get at least that part right, but sadly the poor Ordos have been short-changed. Their units are weaker than the others and make up for it with speed (ie hit and run tactics). Unfortunately hit and run tactics can only take you so far. When you know your enemy can only hit and run, you know you've got him by the 'nads.

If Emperor was music it would be the Backstreet Boys or N'Sync mass market rubbish designed for the lowest common denominator and maximum profits. Of course, you can't blame a company for trying to make money. You also can't expect gamers with any taste and appreciation of good game design to touch this with a 40ft barge pole.

Oh, and the guy with the chrome nose is a nice addition to the cut-scenes. He might even be scary if you could stop laughing at him long enough . . . on second thought, no, he couldn't be.

GAME DETAILS

FOR: Massive number of missions and a dynamic single-player campaign map.

AGAINST: Poor use of 3D, unimaginative design, unbalanced multiplayer, a big fat wasted opportunity.

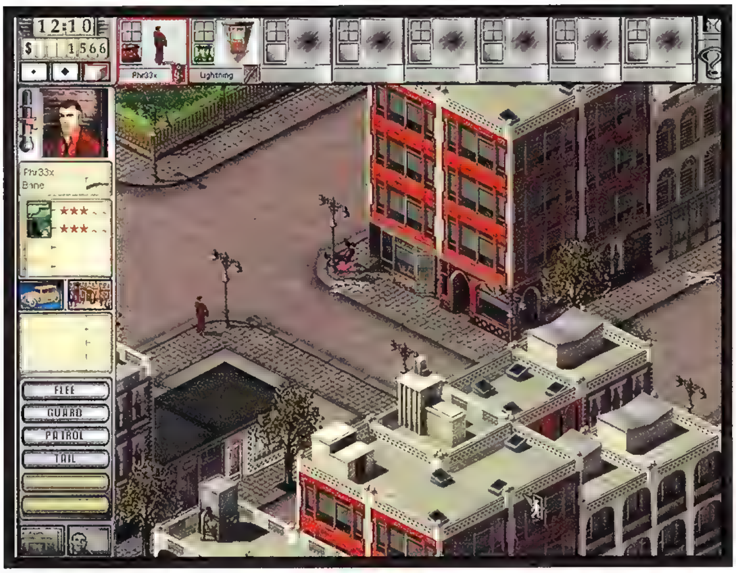
MINIMUM REQUIREMENTS: Pentium II 400MHz, 64MB RAM, 600MB hard disk space, 16MB 3D video
RECOMMENDED: Pentium III/Athlon 800MHz, 128 MB RAM, 32MB 3D video
SOUND APIs: Direct Sound
VIDEO APIs: Direct 3D

DEVELOPER: Westwood www.westwood.com
PUBLISHER: Electronic Arts www.ea.com
DISTRIBUTOR: Electronic Arts www.ea.com

atomic
6.5/10

Gangsters 2

Simon Peppercorn takes aim with his Tommy gun.



ⓘ The interface may be different to the original Gangsters, but it's just as confusing.

Gangsters 2 is a story of revenge. Set around 1930, in the fictional US state of Temperance, you play the role of Joey Bane. Your father has been murdered, and you're pissed. You set about claiming the town for yourself, building an empire of gangsters along the way and avenging your father's death. Your path to the top will not be easy, however. To get there, you must kill, loot, stand over and racketeer your way through 20 episodes and 15 counties.

Gangsters 2 follows the theme set in the original Gangsters game. But this time, if you succeed, you will control organised crime across the entire state. In this version you play in real time, with the story unfolding across day and night. The game is more linear in its approach than its predecessor, as your missions are clearly defined at the start of each campaign. You can't move on until your objectives have been completed.

Gangsters 2 is a game of strategy. Driving around performing indiscriminate drive-bys on your enemies tends to get you noticed. This makes your quest more difficult as more and more people are out for your blood, including the cops.

Played almost entirely with your mouse, the interface is substantially different than the original Gangsters game and, sadly, just as clumsy to navigate. In fact, my major criticism of the game is that it's bloody difficult to control. There is a built-in tutorial, but this only goes through the basics. It took me some hours just to master all the functions, only to find that in the next level there were a bunch of new commands that had to be learnt. There is an on-screen advisor who gives clues about how to proceed at particular points in the game, but this advice is somewhat vague and unhelpful.

Another let-down is that the AI basically sucks. It is often near to impossible to accurately position your men around town. Even if there was an available car nearby I found then taking off across the town on foot, only to be shot dead by a waiting enemy. If you manage to get them into a car to do a drive-by shooting, the car ends up doing U-turns up and down the street, as your enemy stands still shooting back.

> 'I found it easier (and more satisfying) to just blow the buildings up.'

The business side of the game – taking over buildings, and so on – can be disappointing in that you can't actually choose where you want to set up shop. Setting up these businesses is tricky, and it isn't immediately obvious what to do. I found it easier (and more satisfying) to just blow the buildings up.

Different gangsters have different skills they specialise in such as assassin, bank robber, kidnapper, getaway driver and safe cracker. You must recruit and deploy the right man for the tasks you're required to accomplish. As an episode is successfully completed, you're awarded with experience points, which you can then assign to your different gang members and their individual skills.

There is a surprising amount of detail in the game. For example, I laughed out loud when I saw a photographer run over and take photographs of the body I had just gunned down. The graphics have been improved since the first Gangsters adventure. As the game is played in real time you don't have long to make your decisions. When opportunities to achieve your objectives appear you must act decisively or you will likely fail your mission.

Gangsters 2 also features multiplayer, and allows you to set up the game for both Kali and GameSpy as part of the installation.

This is a game that could be so much better than it is. The concept is terrific, but the game simply doesn't live up to its potential.

atomic
4.5/10

GAME DETAILS

FOR: Shooting and looting. Interesting and challenging missions. More shooting and looting.

AGAINST: Clumsy and difficult to play. Graphics are not up to the standard of other RTS games.

MINIMUM REQUIREMENTS: Pentium II 266MHz, 64MB RAM, 650MB hard disk space, 4MB video
RECOMMENDED: Athlon/Pentium III, 128MB RAM, 16MB video, 8x CD-ROM

DEVELOPER: Hothouse www.hothouse.org
PUBLISHER: Eidos www.eidos.com
DISTRIBUTOR: OziSoft www.ozisoft.com

EA Sports Rugby

Des McNicholas lobs the muddy pigskin.

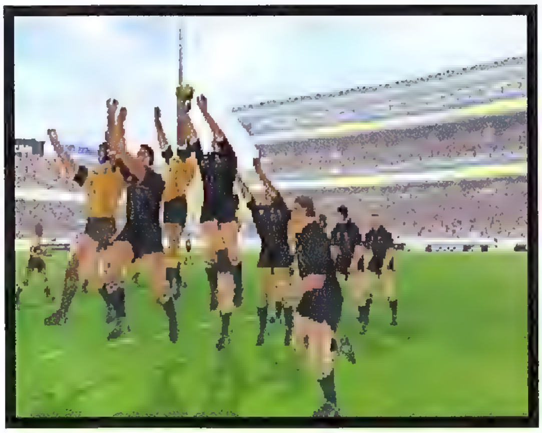
Not surprisingly, EA Sports provided some of the highlights in the PS2's somewhat disappointing early line-up, and its traditional mix of excellent graphics and realism again comes to the fore in EA Sports Rugby. Rugby Union games are always few and far between on any platform, as developers concentrate on the larger Asian, European and US markets, but frustrated Wallabies everywhere finally have the opportunity to scrum down with the best of them.

EA Sports Rugby brings the world's major tournaments including the World Cup; the annual European VI Nations competition between England, Scotland, Wales, Ireland, France and Italy; and the Tri Nations between Australia, New Zealand and South Africa. Sadly, no Super 12s, but there's always hope for the future. Players can also opt for a friendly match between any two teams, or a quick but comprehensive tutorial that covers the intricacies of scrums, line-outs, kicking and team tactics.

Whilst one-on-one is obviously the most satisfying mode of play, the AI does a good job of setting the pace. The relative quality of the opposing teams plays a big role – winning the World Cup still isn't too difficult for Australia – but handicaps can be applied and it's largely luck of the draw at tournament level. Rucks, mauls, scrums and line-outs are well simulated, with the available tactical options making them much more than just arrow key battles. Team tactics can also be developed through EA's Dynamic Team Control function. This lets players preselect a range of offensive and defensive plays before kick-off (the equivalent of pre-game planning), and implement them at appropriate times during the match.

Rugby Union is a complex game, and EA has done a terrific job of translating its subtleties to the gamepad. The controls are relatively straightforward after some practice, and the manual is sensibly presented in tactical terms rather than just linking buttons to actions. Passing, including dummies, is handled from the L1 and L2 buttons, with most other actions controlled by a context-sensitive X button. The most likely function is always mapped to it, so you can easily remain focused on the uprights while you tackle, break free, kick or throw in. The occasional dodgey tackle outcome was the only real problem I noticed, and players will have no difficulties coming to grips with the system.

As usual, EA has incorporated enough configuration options to let players control the action. The Match Environment Screen allows players to choose from 23 international grounds (including Stadium Australia), by day or night in any kind of weather. The Squad Select Screen presents all of the necessary player statistics, with the option of changing the starting line-up, designating the kicker, and dropping players to the reserve bench. Simple skills bars make choosing a balanced team easy enough, and adjustments can also be made during the match itself.



EA Sports Rugby lets you accurately recreate everyone's favourite trans-Tasman grudge matches.

EA Sports Rugby looks terrific, with the auto-camera angles accurately replicating those used by the networks. The transitions don't seem quite as smooth as some of EA's earlier releases, but players are able to change camera angles and viewpoints as they watch stunning replays of their brilliant try. Team strips are correct, and some of the world's leading players' features and mannerisms are modelled in remarkable detail. The grounds are clearly recognisable, and pitch detail is high enough to show wear and tear and the effects of weather. Admittedly, the crowds are a little bland from a distance, but their presence can still be felt by setting the optional cheering level to the high end of the scale!

EA Sports Rugby is a first-class simulation of the world's greatest game, faithfully reproducing the atmosphere of international rugby. It combines a host of features with a relatively simple interface, and EA's meticulous attention to detail should satisfy the most ardent armchair coaches. With EA Sports Rugby, the PS2 continues to come of age.

GAME DETAILS

FOR: Great pace, simple to learn and laden with tons of atmosphere.

AGAINST: Slightly disorienting camera angles and some questionable tackles. Lousy referees – I was NEVER offside!

MINIMUM REQUIREMENTS: PlayStation2, memory card
RECOMMENDED: Dual Shock controller

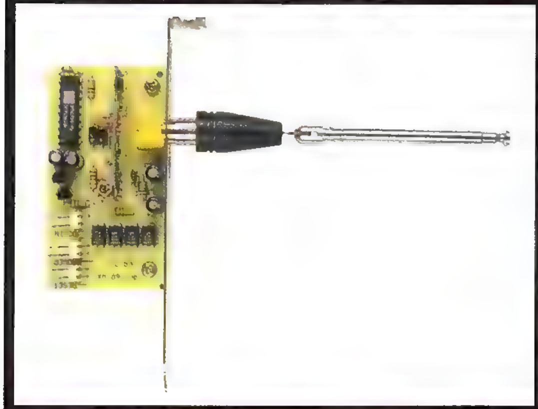
DEVELOPER: EA www.ea.com
PUBLISHER: EA www.ea.com
DISTRIBUTOR: EA www.ea.com

atomic
8/10

Your wish is our command.com

This month's I/O Letter of the Month scores the Just Cooler Computer Remote Control, courtesy of AusPC Market (www.auspcmarket.com.au). Now you too can switch on your PC from the opposite side of the room – hoorah!

Letter of the Month: So many standards to choose from . . .



i I've got a Dell Dimension XPS D233, and I want to upgrade the power supply from the crummy 200W standard one to a 300W unit.

I've got the new power supply unit (PSU) and I've installed it. The plugs fit OK, but the computer doesn't work. What's going on?

Justin Foster

O *What's going on is, you're using a brand-name computer.*

I swear, the guys that design these things must go out into the desert and get drunk and fire birdshot at PC standards documents. Anything that ends up with a hole in it, they change for no reason.

In this case, you've struck one of Dell's dastardly 'ATX' power supplies. These have standard ATX connectors physically, but not electrically. The same plugs, but with wires in different places.

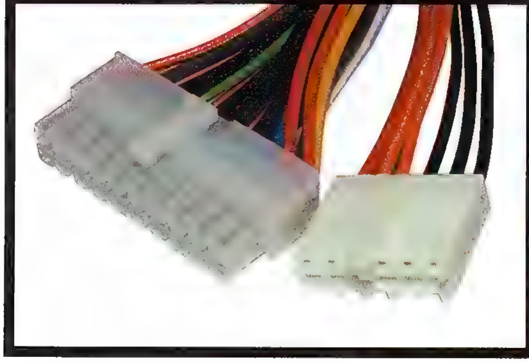
Your motherboard uses the normal big ATX power plug, and also the six-wire 'AUX connector'. The AUX connector isn't used for anything in most mass market PCs, but is nonetheless provided on most PSUs.

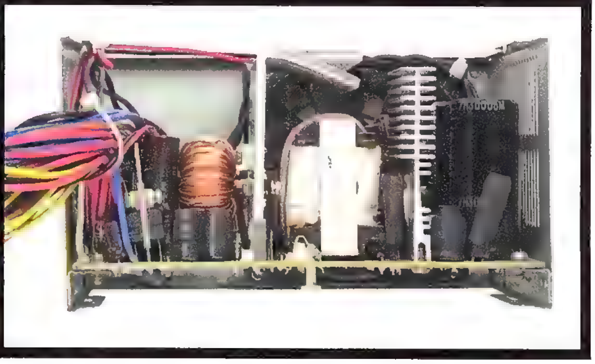
Unfortunately, Dell decided to delete the 3.3V wires from the big connector and move them to the AUX one.

On pages 20 and 21 of the Acrobat-format (PDF) service manual for your computer (online at support.dell.com/docs/systems/dalex/54635a02.pdf*), you'll find the pinout for the power connectors. The wire colours might be wrong - apparently Dell makes machines with blue wires, where page 21 says they should be orange, for instance - but the voltages should be right.*

A normal ATX PSU outputs absolutely everything that the special Dell one does, as far as I know. It's just in different places. So if you want to plug a normal PSU into your Dell motherboard, you'll need to either cut and solder some wires or buy the correct unassembled connectors and pins, and a crimping tool.

It would be uncharitable of me to suggest that this sort of apparently reasonless standard-breaking operation is done by brand-name computer manufacturers to lock customers into using expensive 'genuine' replacement parts instead of perfectly good, dirt cheap generic ones. So I won't.





RIGHT: Dell power supplies may have the same plugs, but they don't necessarily have the same wires. FAR RIGHT They even look similar to other PSUs on the inside.

Failed overclocker #2

I've got an AMD Duron 750MHz CPU, running on a Gigabyte GA-7ZM mainboard. With help from atomic Issue One, I've unlocked the multiplier on the CPU with a pencil. So far so good. The problem now is, the only way I know how to change the voltage of my mainboard is to use the included software EasyTune 3 from Gigabyte. Unfortunately, this program doesn't recognise my CPU, and just terminated itself after a few error messages.

Please help me – is there another way to overclock my Duron?

Tudi

Unlocking the multiplier of that Duron won't do you any good, because you can only change the multiplier if your motherboard supports that feature. The GA-7ZM doesn't.

There's also no way to change the CPU voltage on the 7ZM, in the BIOS or with the EasyTune utility.

The only overclocking feature the 7ZM actually offers is a few frontside bus (FSB) speed settings between 100 and 133MHz. Increasing the FSB speed will give you a faster CPU speed, but other components may or may not deal well with an elevated FSB.

Nothin' but . . . dish?

I have a microwave Internet connection. The service provider is Chello, and they work with Austar to provide the service. I have a few questions about it.

1. Is there any way to get faster gaming? With my modem I can get a ping of 120 or so, but with microwave I get at least 350. Could this be because the POP is far away?
2. What do you think of microwave Internet? Is ADSL or cable better?
3. And, last but not least, can microwave get a higher download rate than 170 kilobytes per second (K/s)?

Luke Evans

Asymmetric satellite systems like the Chello/Austar one, with a broadband microwave download channel but a narrowband modem upload channel, will always have lousy latency. No good for action games.

This is, as you suggest, because something's far away. That something is the geostationary satellite. By definition, geostationary orbit is so far up that the orbital period is 24 hours. If a satellite's over the equator and going the right way, a 24-hour orbital period means it doesn't move relative to the surface of the earth. That's why your dish doesn't have to move to stay pointed at the satellite.

For comparison, a space shuttle can only make it high enough to have an orbital period of about 90 minutes. To get that long orbital period, you've got to put a satellite 35,700km up. It's a little further away for people who aren't right on the equator.

So when your downstream Internet data travels to the satellite at the speed of light – about 300,000km/s – and then back from the satellite to you, the round trip takes about 0.24 seconds. That's your absolute raw minimum downstream trip time. Add in switching delays and the upstream latency – which, for phone line modems, is never too exciting – plus the native latency of the server itself, and 350 milliseconds starts to look like a darn good overall latency.

ADSL and cable are both better than asymmetric satellite if you can get them. If you can't, satellite's the next best thing - just not for action games. At least you can download files at a decent speed.

In answer to your download speed question, the raw download speed a satellite connection can manage is high, but irrelevant for most purposes. It's throttled by the Internet service provider. According to Usenet posts by other users, Chello seem to cap individual downloads at around 30K/s. But you can have more than one 30K/s download running simultaneously.

BX power!

I currently own a Gigabyte GA-6BXC motherboard with 256MB of RAM and a Pentium III 550MHz, all running at a 100MHz. My dilemma is that the 550MHz just isn't keeping up with the crowd.

After some hunting at swap meets (got the idea from atomic) I got a great deal on a Pentium III 667MHz/133MHz (I'm still looking for some PC133 RAM).

I figure the modest rise from 550 to 667MHz, along with the increase in frontside bus (FSB) speed to 133MHz, should make some considerable difference. Now, my motherboard manual states that I can set the system bus to run at 133MHz, but only gives examples up to 650MHz. Just to confuse me a bit more, the latest BIOS upgrade supports Celeron processors up to 700MHz!

Can I install the 667MHz and run it at a bus speed of 133MHz on my GA-6BXC?

Michael Gonzalez

Yes, you can set the FSB speed of the GA-6BXC to 133MHz, though the manual doesn't tell you how. You do it with the same DIP switches you use to set the bus speed normally, and you set DP1, DP2, DP3 and DP4 to OFF, OFF, ON and OFF, respectively.

Good Intel 440BX chipset motherboards, like the 6BXC, have a decent chance of working properly at 133MHz FSB. They support the 1/4 multiplier for PCI bus speed, so the bits of the computer that want to run at 33MHz will be allowed to keep on doing so.

But if you're using an AGP video card, it's going to get its neck wrung. No BX board supports any multipliers for AGP bus speed but 1/1 and 2/3. The AGP bus clock speed is 66MHz. So you use the 1/1 multiplier for 66MHz FSB (which is what that 700MHz Celeron uses, by the way), and 2/3 for 133MHz.

At 133MHz FSB, though, 2/3 gives you a 33% overclocked AGP bus, which your graphics card may or may not tolerate.

Nothing will explode if the speed's too high; the computer just won't start, and you'll have to wind the speed down again.

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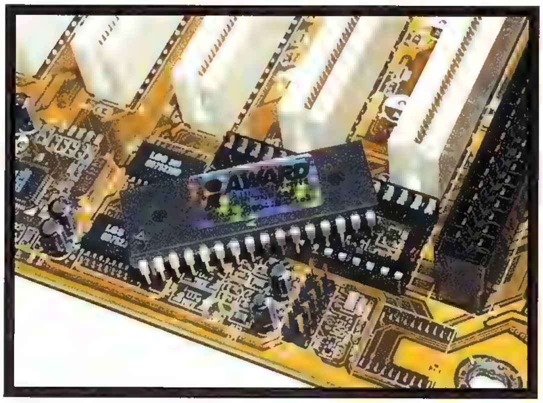

You can remove a BIOS chip - carefully - while a computer's running

Borked BIOS

I tried to flash my BIOS with a new version, but unfortunately I made some mistake and now I can't boot my PC any more.

My motherboard doesn't support 'dual BIOS' or something similar.

The board is still under warranty. I tried to contact the retailer and their response was that they have to send it back to the manufacturer. Oh, no! That's in Taiwan! So it would take at least a couple of weeks until I could use my board again.

Come on! It's just a BIOS. There must be some way to re-flash that thing, right?

I tried to remove the battery from the motherboard and use the clear CMOS jumper, but as I said, it's dead.

'Abit Win'

There is indeed a way to fix a BIOS EEPROM chip whose contents have been corrupted. One way to do it is with an expensive dedicated EEPROM burner, but you don't need one.

Instead, you can use another, working computer using the same motherboard. You start the working computer and boot with a floppy as if you were about to flash the BIOS as normal.

Before you flash the BIOS, though, you remove the BIOS chip in the running computer from its socket and substitute the munged one from your other motherboard. You can do this because, in modern PCs, the BIOS only does stuff at the start of the boot process. You can remove and replace it after that.

With the munged BIOS chip in place on the running computer, you can flash it as normal. Then you remove it and put it back on the first board.

You can flash the BIOS for one motherboard on a computer with a different motherboard if the chips are compatible and the flash utility lets you do it.

If you don't have another computer sitting around, various computer shops can do the job for you.

Clockin' a Compaq?

I have been reading your articles concerning the overclocking of the AMD Duron and BIOS tweaking. I own a Compaq Presario 5000 with an AMD Duron 750MHz, but I don't seem to have a BIOS like anything you have shown. Is it possible to get around the Compaq BIOS so that I can overclock?

Brad Morris

Nope. It's a brand-name computer. Some brand-name machines have motherboards with some sort of CPU setting tweaking capability – like the Dell machines that have special ASUS boards in them, for instance – but it's not the way to bet. And they never have the high level of tweakability present in an off-the-shelf overclocker's motherboard.

Network notwork!

I have two computers: one is a Pentium 266MHz and one is a Pentium Pro 200MHz. I'm having trouble with the Pentium Pro.

I've tried to network these machines heaps of times since I got the motherboard and processor, but it just doesn't work. The computers only see themselves and not each other.

Every other person I've asked always says 'are they on the same workgroup?' or 'are the same protocols installed?', and both times I answer yes and they can't help me either. I've tried it with both crossover (tested and working) and BNC (tested and working) cables, and numerous different network cards in both the computers.

The Pentium Pro's motherboard is an Acer brand, and it's almost impossible to find any technical support because it's so damn old.

I know that the 266MHz networks properly, because I take it to a LAN party every now and then, and it works fine.

Both computers run Windows Me and both have the latest drivers for the network cards (both use Realtek RTL8029(AS) PCI cards). Can you help?

Chris Holzworth

If you install the TCP/IP protocol on both machines and give them fixed IP addresses on the same subnet (192.168.1.100 and 192.168.1.101, for instance, subnet mask 255.255.255.0 for both), then if both network adaptors and your cable are working, they'll be able to ping each other. Open a DOS prompt and type:

```
ping 192.168.1.100
```

(or whatever the address of the other machine is). If you get the message 'Reply from...' (and so on), then the link is fine.

If you get 'Request timed out...', my money would be on misconfigured or otherwise dud hardware. I don't know how the motherboard could possibly be the problem, unless it's got a resource conflict that would stop you from setting up the network card properly in the first place.

If the ping works, you can go on to bind whatever you want to TCP/IP, or remove it and add other protocols, or add other protocols and not remove TCP/IP – or do whatever the heck else you want. Windows lets you pile up as many protocols and services as you like.

Turn on File and Printer Sharing (it will by default bind itself to all available network adaptors), share at least one folder or drive on each machine, and you should see each machine in the other one's Network Neighborhood. Windows doesn't show machines in Network Neighborhood if they have nothing shared – that's a common beginner problem, by the way.

Send your questions to io@atomicmpc.com.au or by post to:

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Win a Panasonic e-wear MP3 player valued at $1050

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PLUGGING YOUR PORTS

Feeling paranoid? Convinced that everyone on the Internet is out to get you? John Gillooly grabs his carpet bag and sells a little peace of mind.

With the growth of broadband, the susceptibility of your PC to attacks is greater than ever. Because broadband users have combination of a permanently assigned IP address and an 'always on' connection, it makes them easier to track down. This sits side by side with the increased availability of software that exploits such gaps, which is also becoming a lot easier for novices to hack.

The best way to protect your PC from attack is to stay offline at all times. This is, of course, completely unfeasible. But there are some other steps you can take to make sure you are as secure as possible when online. The best way to protect yourself is by using what is known as a personal firewall, which allows you to manage incoming and outgoing Internet traffic. A firewall is not a virus scanner, and as a general rule it will not protect against viruses. But it will act to block Trojans from sending or receiving data as well as stopping any malicious probes, pokes and prods from outside your machine.

There are several firewalls available – both free and commercial. We have found that the best option is to employ a combination of two packages: the free for personal use ZoneAlarm from Zone Labs, and the commercial BlackICE Defender from Network ICE. Both of these packages do slightly different things; ZoneAlarm allows the user to choose which programs can access the Internet, and BlackICE detects, blocks and provides information about any outside attacks. If you don't want to run both pieces of software, then ZoneAlarm will be adequate, but the best security solution comes from the use of both packages.

There are a host of products that perform similar tasks, but this combination is a tried and true way of blocking malicious external attacks. There is a common myth circulating that by running these two software packages in conjunction with each other they will cancel each other out, but this is not true.

Step 1: Keeping your PC secure

Before installing your firewalls, there are a few simple steps you need to follow to minimise your PC's level of exposure. The first is to disable File and Print Sharing in Network Properties. If you have multiple network adaptors or use a dialup connection, you will need to disable this in the 'bindings' section in the Advanced Properties of the network card or dialup adaptor. If you are using WinGate to share a network connection, then turning off 'logging' will close an extra port.

The other protective measures are just common sense. As a rule of thumb, try to close any programs that you aren't actually using. This minimises the number of open ports on your machine. If you want to know what ports are open, then launching the DOS prompt and typing the command 'netstat –a' will give you a list of currently open ports and connections.

Besides a firewall, you should also run a virus scanner. The majority of commercially available scanners will do, however, try to avoid using Symantec's Norton AntiVirus (NAV). While it is a good solution for novices, power users need to be aware that NAV is infamous for causing problems with Windows, and the question 'Are you running Norton AntiVirus?' is one of the most common introduction lines from technical support crews worldwide.

Step 2: Zoning in

ZoneAlarm is freely available for personal use and can be downloaded from www.zonelabs.com. There is also a commercial product, ZoneAlarm Pro, which can be purchased via Zone Labs' Web site. The majority of users will be happy with the free version, and here we'll focus on getting it up and running.

Once you have downloaded and installed the software you will find it running happily in the taskbar. Double-clicking on the ZA logo will bring up the ZoneAlarm control centre. This is a fairly clear interface that shows what programs are permitted to access the Internet. It also provides an easy visual method for setting your Internet security level.

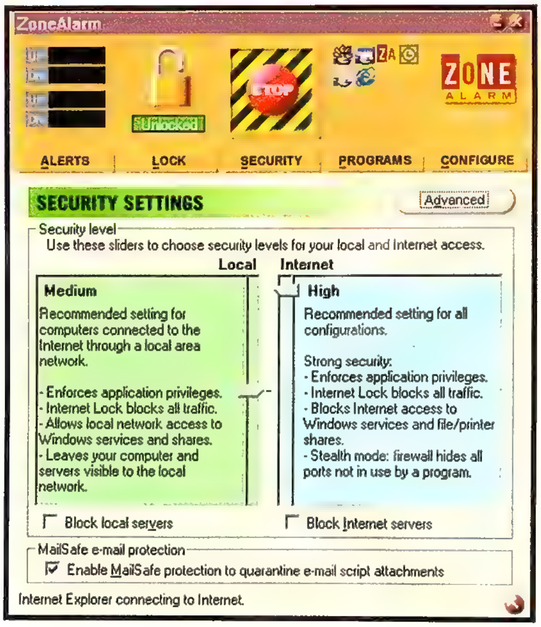
This is done through the Security button. When you hit this button you will see a window with two slider bars. If you are running a network, then set the local security settings to Medium. This allows you to still run local network file and print sharing, but blocks external access. The best setting for your Internet connection is High security. However, this may cause disconnections from some Internet service providers, notably Telstra BigPond Advance. The reason for this is that the 'Stealth mode' acts to block the port used by the 'heartbeat', a signal sent to stop unauthorised connection sharing. In this case, set the security level to medium, as it will still provide an adequate level of protection.

ZoneAlarm operates via an elegant interface. When a program first tries to access the Internet, it pops up a small box with the program name and some other details. There are two main things you need to do when this happens: approve or disallow the access, and then decide whether you want it to prompt you the next time it connects. Generally, only allow programs you recognise to access the Internet. Treat all other applications, particularly those you are unsure of (like run dll), on a case-by-case basis.

>

Difficulty

A quick and easy way to secure your PC.



SECURITY SETTINGS

Security level
Use these sliders to choose security levels for your local and Internet access.

Local	Internet
Medium Recommended setting for computers connected to the Internet through a local area network. - Enforces application privileges. - Internet Lock blocks all traffic. - Allows local network access to Windows services and shares. - Leaves your computer and servers visible to the local network.	**High** Recommended setting for all configurations. Strong security: - Enforces application privileges. - Internet Lock blocks all traffic. - Blocks Internet access to Windows services and file/printer shares. - Stealth mode: firewall hides all ports not in use by a program.
☐ Block local servers	☐ Block Internet servers

MailSafe e-mail protection
☑ Enable MailSafe protection to quarantine e-mail script attachments

Internet Explorer connecting to Internet.

If you authorise a program to always access the Net and then later regret it, it's possible to change it. Open the ZoneAlarm control centre, go to the Program tab and you'll find a list of programs with their permissions. From here it's easy to remove a program from the list by selecting it and pressing Delete. You can also change the level of access given to all of the programs through this window.

The control panel can also be used to engage a lock on all Internet activity – a good fallback if a malicious program does make it past the firewall. This is done by hitting either the bright red Stop button (a handy thing when you're under pressure) or by going to the Lock section of the control panel.

The Alerts window will provide you with information about external connection requests, but this feature is made redundant if you run BlackICE Defender, as this program logs incoming attacks much more effectively.

Step 3: Screwing with your wetware

BlackICE is a term made famous by William Gibson in his cyberpunk novels. In these books BlackICE is the ultimate countermeasure. Imagine a firewall that can fry the brain of even the most ardent script kiddie, and you get the idea.

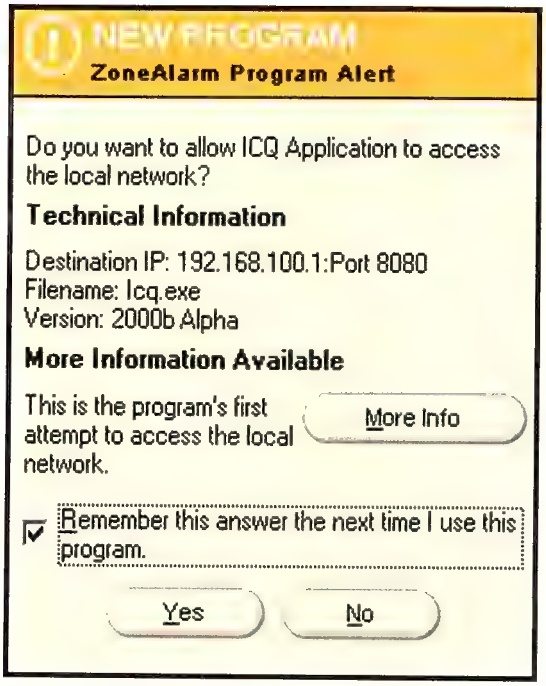
BlackICE Defender does not go to these extreme measures – some might say unfortunately – but it does provide a comprehensive amount of blocking, and logs all the pokes and probes being made to your computer while simultaneously increasing your sense of online paranoia.

BlackICE Defender is a piece of commercial software, and one that has had doubts thrown on it by some of the more vocal members of the online security community. However, when used in concert with ZoneAlarm we have found that it provides a comprehensive security blanket. You can purchase the software online at www.networkice.com.

When you install BlackICE there are a few things you need to do. By right-clicking on the blue BlackICE icon in the taskbar and selecting 'Edit BlackICE settings…' you will bring up the Settings window. First, select the Trusted Addresses tab and click 'Add…' In the window that pops up enter '0.0.0.0', which will stop any screwy false attacks coming from your own machine. Also enter the IP addresses of any computers on your local network.

The next tab to look at is Protection. This gives you four available levels of security. Like ZoneAlarm, it is advised to use the highest setting, Paranoid. But

ZoneAlarm informs you whenever a program tries to go online.



ZoneAlarm Program Alert

Do you want to allow ICQ Application to access the local network?

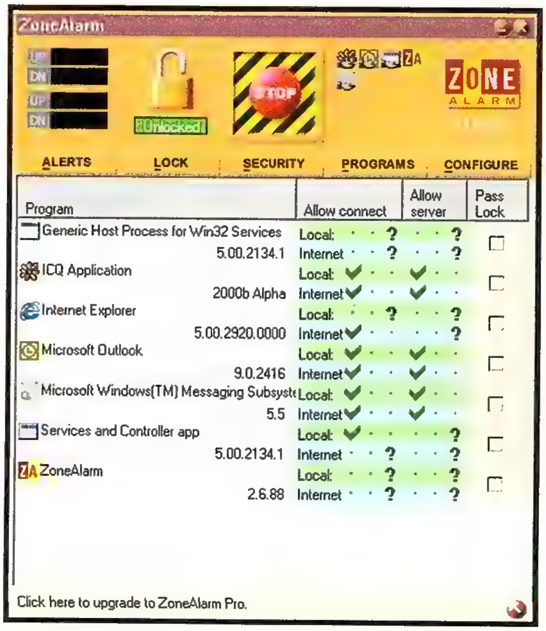
Technical Information

Destination IP: 192.168.100.1:Port 8080
Filename: Icq.exe
Version: 2000b Alpha

More Information Available

This is the program's first attempt to access the local network.

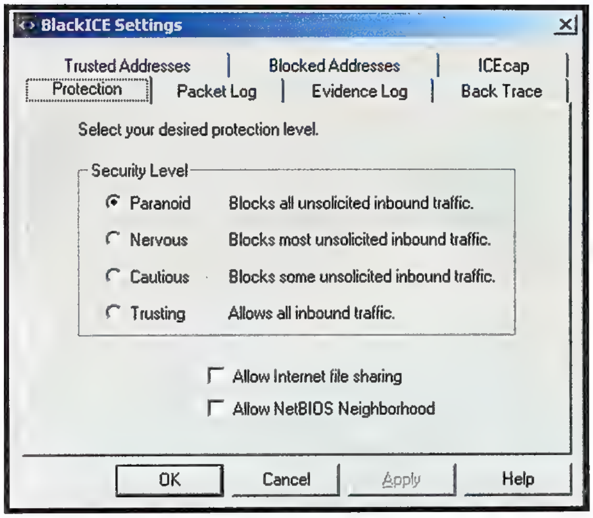
☑ Remember this answer the next time I use this program.



Program	Allow connect	Allow server	Pass Lock
Generic Host Process for Win32 Services	Local: ?	?	☐
5.00.2134.1	Internet ?	?	
ICQ Application	Local: ✓	✓	☐
2000b Alpha	Internet ✓	✓	
Internet Explorer	Local: ?	?	☐
5.00.2920.0000	Internet ✓	?	
Microsoft Outlook	Local: ✓	✓	☐
9.0.2416	Internet ✓	✓	
Microsoft Windows(TM) Messaging Subsyste	Local: ✓	✓	☐
5.5	Internet ✓	✓	
Services and Controller app	Local: ✓	?	☐
5.00.2134.1	Internet ?	?	
ZoneAlarm	Local: ?	?	☐
2.6.88	Internet ?	?	

Click here to upgrade to ZoneAlarm Pro.

The Programs window allows you to set separate access levels.



Select your desired protection level.

Security Level

● Paranoid Blocks all unsolicited inbound traffic.

○ Nervous Blocks most unsolicited inbound traffic.

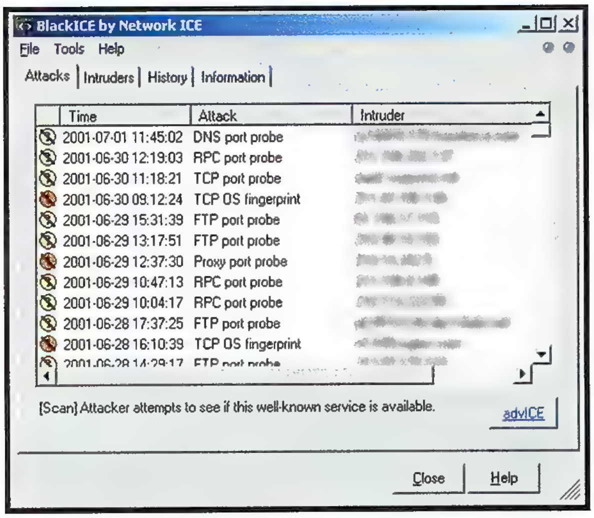
○ Cautious Blocks some unsolicited inbound traffic.

○ Trusting Allows all inbound traffic.

☐ Allow Internet file sharing

☐ Allow NetBIOS Neighborhood

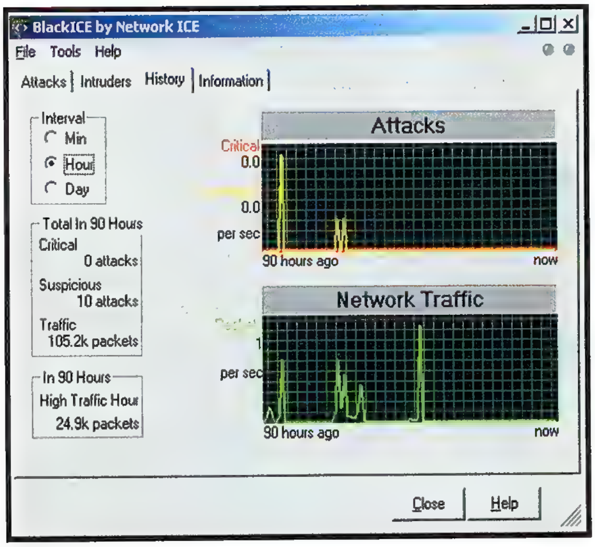
ⓘ Everyone should at least be Nervous, if not Paranoid.



Time	Attack	Intruder
2001-07-01 11:45:02	DNS port probe	[redacted]
2001-06-30 12:19:03	RPC port probe	[redacted]
2001-06-30 11:18:21	TCP port probe	[redacted]
2001-06-30 09:12:24	TCP OS fingerprint	[redacted]
2001-06-29 15:31:39	FTP port probe	[redacted]
2001-06-29 13:17:51	FTP port probe	[redacted]
2001-06-29 12:37:30	Proxy port probe	[redacted]
2001-06-29 10:47:13	RPC port probe	[redacted]
2001-06-29 10:04:17	RPC port probe	[redacted]
2001-06-28 17:37:25	FTP port probe	[redacted]
2001-06-28 16:10:39	TCP OS fingerprint	[redacted]
2001-06-28 14:29:17	FTP port probe	[redacted]

[Scan] Attacker attempts to see if this well-known service is available.

ⓘ A blow-by-blow description of everyone who is out to get you.



Total In 90 Hours

Critical
0 attacks

Suspicious
10 attacks

Traffic
105.2k packets

In 90 Hours

High Traffic Hour
24.9k packets

ⓘ An easy way to see the frequency and severity of attacks.

> '. . . this will be someone randomly scanning a block of IP addresses to find open ports.'

some ISPs like Telstra BigPond will have problems on this setting. If you experience disconnections, drop the security level to Nervous. Generally, you will not want to allow Internet file sharing. If you want to share files setting up an FTP site is a much better option. You should also leave Allow NetBIOS Neighborhood unchecked.

You also need to go to the Packet Log and Evidence Log tabs and turn on logging. This will give you an idea of who has been scanning you. The majority of the time this will be someone randomly scanning a block of IP addresses to find open ports, but occasionally it will be a specific attack on your machine. In order to get the most information out of the program leave the Back Trace tab set to its defaults. Once this is set up hit Apply and close the options window.

Now double-click on the taskbar icon, which will open the BlackICE program window. The first tab is called Attacks and should be empty when you first open it (there may be one or two entries from 0.0.0.0, but this should stop once you have entered this into Trusted Addresses). The Attack window shows you who has tried what against your machine. When you double click on an attack it will switch to the Intruders tab and show what information BlackICE was able to find about the intruder. If you want to know what a specific attack is, then select an entry and hit the advICE link at the bottom of the window. This will open up a page on the BlackICE Web site explaining the attack.

The other tab to take notice of is History, which provides a graphical representation of both the frequency and severity of attacks as well as your incoming and outgoing network traffic. If you click on one of the yellow peaks on the graph this will open the Attack tab and provide you with details of that specific attack, including a reverse DNS lookup that will show you exactly who is responsible.

Step 4: Basking in the warm glow of success

Once you have your PC locked down you can then sit back and feel pretty darn smug. Enjoy it, because in a day or two you will be convinced that everyone is actually out to get you. As your BlackICE Attack window slowly fills with all manner of probing, try not to worry too much. The majority of the attacks will be part of random scans of IP blocks, and those that are actually directed at you will now be negated by your defenses.

HACK ATTACK

When it comes to security, who better to ask than a cracker? Ashton Mills catches up with one of Australia's most renowned crackers, Necron, to ask him about life, love and the art of cracking high-security installations.

atomic: How long have you been on the scene, and how did you get involved in the first place?

Necron: I was on the scene for a few years; around six if memory serves me right. It started back in the BBS (Bulletin Board Systems) days, when I had my first computer, a trusty Tandy TRS80 (Color Computer 2) – amazing little machine. I still have it to this day.

Being on the BBS Scene I met a lot of other people who were modifying their computers (my TRS80 had a massive 64K of RAM, unlike the standard issue model which had 16). Through BBSes I got involved with people who coded 'demos', then some pirates. Later, when I had the trusty Commodore 64 set up to run a BBS of my own, my friends used to try to log in as the sysop.

From there my group of friends got interested in gaining more access than we really should have had – from talking our way into the places that BBSes were run from and trying to watch the sysop type in their password, to using our brand-new 300 baud modems to dial into the modem line at the local bank and attempting to guess the passwords there.

atomic: Are you still involved today? Why/why not?

Nectron: No :) Numerous reasons . . . the authorities were (pardon the pun) cracking down, and it was becoming more and more difficult for a group to survive. Our group ended up disbanding, and I just lost interest.

atomic: What was the name of your group and what sort of places did they crack?

Necron: The name of the group was Synergy. The types of places we usually hit were either people that managed to get themselves on our bad side, or any high-traffic sites where we would get lots of exposure; government agencies, for instance.

atomic: What sort of tools did you use, and have they changed much over the years?

Necron: The first hacking group I was in didn't use much more than a brute-force password cracker. If you knew the phone number and username, it would run a dictionary over the possible passwords. Then it would dial in, and keep trying to log in as the user until it got it right. Most places we dialled into did not have a disconnect feature if you got the password wrong three times.

In the most recent group the tools were varied. Not being a programmer myself, I didn't get in much on the writing of our tools or back doors, but we used anything from fork bombs, root exploits and sudo'd hidden files once we were in a machine. Getting in was usually done by taking advantage of bugs in Unix.

atomic: What are fork bombs, root exploits and sudo'd hidden files?

Necron: Fork bombs are simple programs that replicate themselves as fast as the system can process it, and generally slow the system to unusable levels within a couple of seconds. These are especially useful if you can set them up in the system's startup scripts, and you want the machine to remain down for some time.

Root exploits, put simply, are bugs in system processes (like sendmail). They are the whole reason that programs nowadays run as their own user (with no root privileges). It was possible to gain access to a root shell if the bug was severe enough.

'Sudo' is a program that allows you to run another program with root privileges. If you hacked root on a system once, setting up hidden (or disguised) sudo files would allow you to get root access without having to hack the system again (because the back doors would already be there).

atomic: Is anything ever uncrackable?

Necron: In my opinion, no. Take Windows, for instance, (allegedly) the most professional operating system in the world. Its full of holes – there are so many exploits.

I believe that if there's one person, or a small group of people writing a piece of software to secure it, and the hacker community on the other side of the fence (with a few thousand more people behind them) trying to find holes, odds are, if there is a problem with the software, it will be found and exploited. Take a look at what happened with DVD encryption!

atomic: With the right knowledge and the right tools, what sort of antics can you get up to?

Necron: Disconnecting people's machines from the Internet without actually hacking their computers; taking complete visual control of their desktops (Windows machines); taking behind-the-scenes control of their computers; opening/closing programs;

reading information from their hard drives while uploading or downloading files to/from their computer (Windows machines).

Or you could do something much bigger. Having hacked root access on some machines in America, my group had access to vast amounts of bandwidth that Australian ISPs had never seen (and practically all still don't). If we really got upset with a group of people who lived in countries with smaller bandwidth, we occasionally ended up flooding so much information to the ISP these users were on that we would fill the entire country's bandwidth, effectively stopping the country's Internet access for a while.

atomic: What's the most high-profile place you cracked, and why?

Necron: The 'why' is more often than not to see if it was possible. It was 'the thrill of the chase', to be completely unoriginal in my answer.

The highest profile place in Australia: ASIO. Outside Australia: NASA

atomic: What's your proudest achievement in your time as a cracker?

Necron: The fame. :) For someone who was (at the time) in their teens, being able to show up in practically any online hacking community in the world and be known to all present was a great feeling.

atomic: Have you ever been in trouble with the authorities?

Necron: Yes. Opening the front door at my mother's house one day, there were three guys in black suits standing on the other side, and the first thing that ran through my mind was 'Oh, shit'. They asked me who I was, then when I told them my name they asked if they could look at my computers.

I almost choked for a moment, and I asked them if they had warrants to search the premises. The reply was a no, so I told them I was not going to let them in the house.

As soon as the door was closed, I ran upstairs and formatted several hard disks. They returned not long afterwards, warrant in hand, and were not overly pleased when all they found were some freshly formatted hard disks!

atomic: Are there good crackers and bad crackers?

Necron: I'm still not comfortable with how the meaning of the word 'hackers' has changed. When I was doing this, it was called hacking. So I'll just refer to it as 'hacking'. :)

Of course. A bad hacker would never be able to break into systems. There are people who hack for fun or knowledge, and genuinely mean no harm to the systems that they are hacking into. It's really just a test of personal skill. These people often also inform the places they've hacked of the vulnerabilities they have found, so they can be patched up, which is nice of them. And then there are people who do it to destroy data or hurt corporations, and it's these people that most people think of when they hear the word 'hacker'.

So when it comes down to it, it's more about the person's intent toward the system they are trying to break into.

atomic: Are you still interested in the scene?

Necron: I still hang out with hackers, talk to them online, listen to stories of today's hackers and what they do. Friends constantly forward me links of corporate Web sites that have been hacked, and I always go see. I'm still as curious now as I was then but, no, I'm no longer interested in being an 'active participant' of the scene (read: see section on trouble with authorities).

atomic: What sort of hardware do you use at the moment?

Necron: Mainly AMD processors and a Celeron thrown in for good measure. Most of it is fairly average equipment, with one high-end machine. Though, due to the lack of broadband availability in Australia (and Telstra's 3GB cap, which made me cancel my subscription) I'm back to modem land.

atomic: What sort of tips would you give for securing your system while online?

Necron: Pick one:

- Hire an ex-hacker :)
- Format your hard disk
- Unplug your modem

Seriously, though, run a firewall, get someone who knows what they're doing to set it up for you, and try not to piss people off. Even in chatrooms, if you upset the wrong person, they're likely to get 'Net rage' and flood you, or hack your system.

atomic: What about tips to remain anonymous to prevent this sort of thing happening?

Necron: Never EVER give anyone your real details, not even your ISP. And don't brag about your hacks – people gossip. Don't give out any of your personal details, don't use your real name on Web sites or email, don't configure your mail client to display your real name. This helps stop spam too. Be sure to never elaborate on where you live, and try to refrain from naming the places you hang out and where you work.

Most of the hackers that I knew all had more than one persona, more than one set of details (like date of birth, description, location) and would usually tell anyone who asked for information to sod off.

atomic: Thanks, Necron. Any last words for the atomic readership?

Necron: A message to today's hackers: it's actually spelt 'Elite'.

Doing the lap dance

Bennett Ring is keeping it smooth.

Lapping your CPU does not involve you placing the chip on the ground before running in circles around it. Neither does it involve placing the CPU on your lap before trying to stuff a wad of dollar bills into its heat spreader as it waves its pins erotically in front of your face. No, it actually refers to the process of making the surface of the CPU, as well as its heatsink, as flat as a mirror and smooth as a baby's butt.

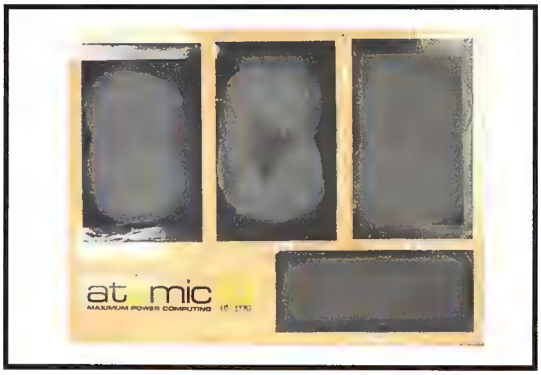
The principle behind lapping is that the better the fit between the CPU surface and the heatsink surface, the better the transfer of heat from the CPU to the heatsink. This should equal a lower operating temperature for your CPU. And to get the best contact between the CPU and the heatsink, their surfaces need to be perfectly flat. You'd think that the manufacturers of heatsinks and CPUs would therefore make the surface of these components as flat as possible, but closer examination reveals this isn't always the case.

In fact, most heatsinks have a surface that is about as flat as Anna Nicole Smith's chest. Due to the process used to manufacture the heatsink, the contact surface is often either concave or convex, which is why thermal paste is used. The paste serves as filler for the minute gaps between the heatsink and the CPU caused by their imperfect surfaces.

Lapping became most popular a few years back, when Intel's and AMD's CPUs had heat spreaders mounted on top of the CPU die. Temperature drops as high as 5°C were measured after sanding back the surface of the CPU heat spreader. However, with the advent of the FCPGA CPU packaging, lapping isn't quite as relevant as it used to be. The FCPGA chips (Pentium IIIs and Socket A Athlons being prime examples) no longer have a heat spreader mounted on top of the die. Instead, the die is exposed so that it connects directly with the heatsink, and is almost perfectly flat directly from the fabrication plant.

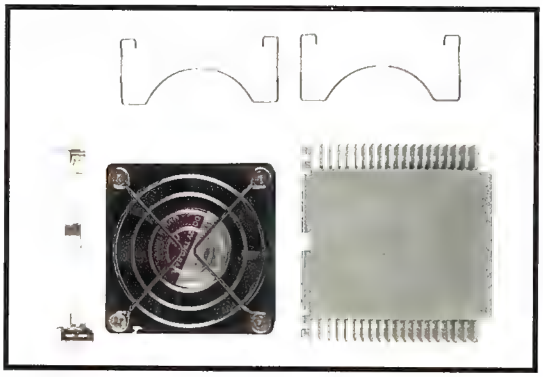
This means that if you try to sand back the surface of a modern FCPGA CPU, you run the very real risk of exposing the innards of the CPU to the world. While it's not quite as gory as displaying the innards of a pig, the end result is still the same – one dead unit that isn't going to oink any more. Thankfully, FCPGA CPUs have a very flat surface straight out of the factory, so lapping them isn't necessary anymore.

However, lapping the CPU heatsink can still yield noticeable temperature decreases, depending on the heatsink. The flatter the heatsink when bought, the less difference lapping will make. We lapped three different heatsinks, and it made absolutely no difference to two of these. But – and it's a big 'but' – we recorded a temperature drop of 3°C on our third heatsink. To the non-overclocker, this isn't a great deal. But to an avid tweaker, 3°C could add an extra 50 or even 100MHz to their overclocked chip, which makes it a worthwhile project. So, just how do you lap your heatsink?



ⓘ Step 1: The lapping board

First, we need to create our lapping board. We used a piece of hobby wood, as it had an extremely flat surface with the added bonus of being very cheap. Glass is the best surface to use if you can afford it, as it has the flattest surface possible, but make sure it is strong enough to handle the pressure that you will be applying to it. Stick a piece of each grade of sandpaper to your board, remembering or marking each different type. If you can't fit all of the pieces onto your board/glass, stick the heaviest grade down first. When sticking it to the surface, try to make the sandpaper as flat as possible, removing any wrinkles or bumps.



ⓘ Step 2: Gimme that heatsink

Remove the CPU heatsink from your PC before detaching the heatsink fan. This usually involves unscrewing four screws or unclipping a couple of clips – either way, it doesn't require a rocket scientist to figure out.

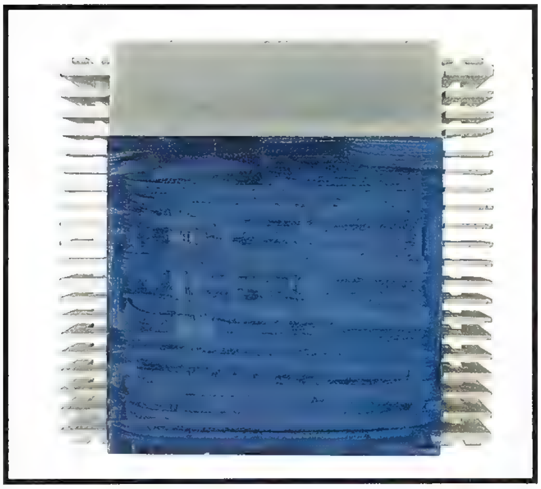
What you will need:

- 1 sheet of safety glass or similar flat surface
- 1 320 grain wet/dry sandpaper
- 1 500 grain wet/dry sandpaper
- 1 800 grain wet/dry sandpaper
- 1 1,200 grain wet/dry sandpaper
- 1 roll of masking tape
- 1 permanent marking pen
- 1 heatsink/fan combination
- 1 dust mask

Difficulty

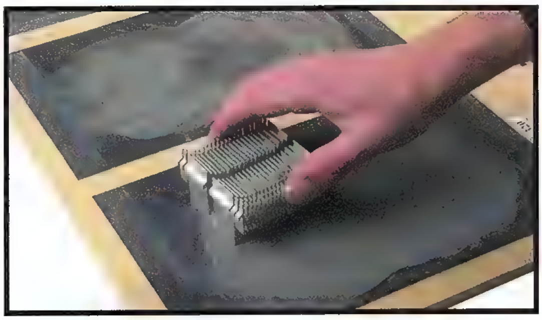
CPU lapping

Even though it's not recommended to lap the die surface on a modern FCPGA CPU, we thought we'd give it a shot anyway, using an old Celeron 700MHz from the Labs. These CPUs have a thin layer of protective coating covering the CPU, so we thought we'd get rid of it to see if cooling improved. Using the finer grades of sandpaper we lapped the CPU until it had a clear metal finish, removing all traces of the protective layer. Luckily, the CPU still functioned perfectly, but we noticed absolutely no difference in temperature. This lead us to the following conclusion: lap your heatsink, not your CPU. The risk involved with CPU lapping, means it's just not worth it.



Step 3: Overclockers like to colour

Colour in the bottom of your heatsink fan with the permanent marker, as shown in our photo. This enables you to see which areas of the heatsink aren't flat as you are sanding it, as these areas will retain the pen marks. Let the ink dry totally before you start your lapping.

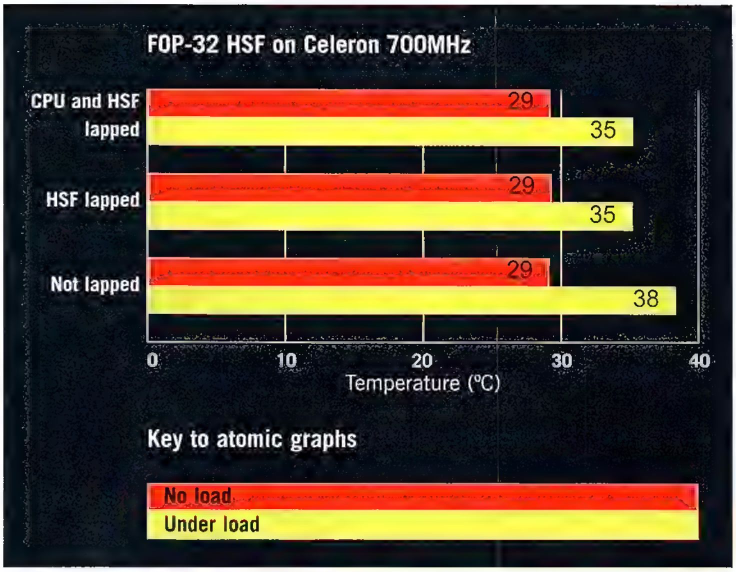


Step 4: Let the sanding commence

Beginning with the roughest grade of sandpaper, sand the bottom of the heatsink in a figure of eight motion until all traces of the marker are gone. Hold the heatsink firmly in the palm of your hand while paying special attention to keeping it perfectly flat against the sandpaper. By sanding in a figure of eight motion you ensure that the entire surface is sanded equally. You can use a backward and forward motion instead, but make sure you regularly rotate the heatsink to stop any areas being sanded more than the rest. If you are using wet and dry sandpaper, wet the paper to both stop the dust and to make the sanding easier. If you would prefer to use dry sandpaper, make sure you wear a dusk mask, as the metal dust produced likes nothing more than to stick to the interior of your lungs.

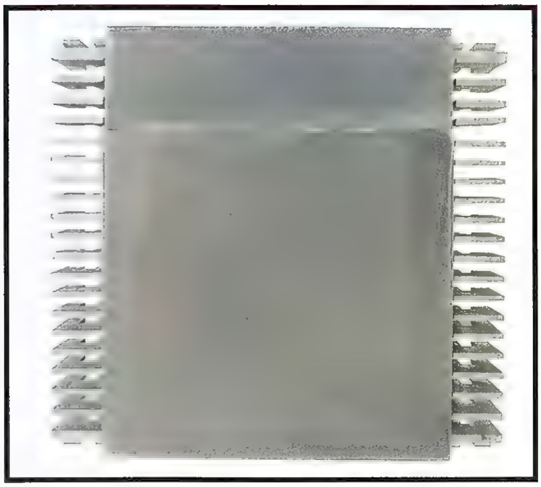
Step 5: Going up a grade

After about 10 minutes you should notice that all of the marking pen has been sanded off the bottom of your heatsink. If it isn't, keep sanding until it's all gone. When it has completely disappeared, colour in the bottom of the heatsink again, before moving the heatsink to the next, finer grade of sandpaper.



The difficulties of measuring temperature

We mentioned that we didn't notice a temperature decrease with two of the three heatsinks that were lapped. This may be because the heatsinks were used on an AMD Athlon system, as opposed to the Celeron system that the third was tested on. The Athlon doesn't have a built-in temperature probe, so if the temperature drop wasn't large, it wouldn't have been detected.



Step 6: Repeat

Keep sanding through the different grades of sandpaper until you have used all of the grades. After sanding on the finest grain, your heatsink should have a perfectly smooth and flat surface. Clean away any traces of metal dust, before reattaching your heatsink's fan. Apply a very thin layer of thermal paste and then attach the heatsink to your CPU. Don't forget to plug the heatsink's fan back into your motherboard, as this is easy to overlook.

Fire up your PC and if your heatsink was dodgy to begin with, you should notice a temperature drop of at least a couple of degrees. You can apply this process to any heatsink that would benefit from having a flatter surface.

Lettuce

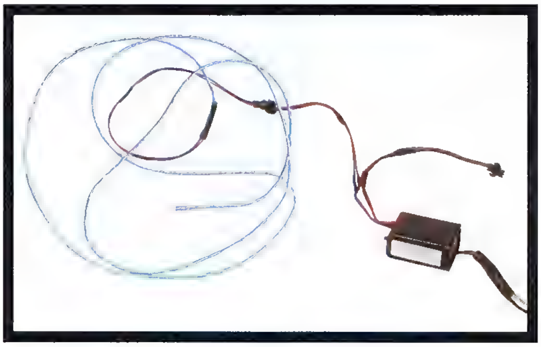
Letter of the Month and Post of the Month, being glowing examples of atomic wordcraft, each win the EL Wire kit from PC Case Gear, (03) 9505 6239. Shine on you crazy diamonds!

Forum Post of the Month
Games: A driving force in technology

www.atomicmpc.com.au/forum.asp?cat=ge&top=6534

The Golden Boy Wilkshake has done it again. Here's proof that at atomic we don't rig anything – Wilks won fair and square, again, so he gets the prize. Go you champion!

The Wilkshake scored big this month, also picking up the ASUS GeForce3 for naming Captain Atomic's sidekick. It'll look nice wrapped in EL Wire!



Letter of the Month: Alternative overclocking

I have just bought my first copy of atomic (and no, that doesn't mean that I stole the previous issues) and was dazzled by the article on water cooling. All those wondrous little gadgets and ding-whatsits and I haven't got ANY of them yet. Drool, drool. One of the guys at the local computer shop built his own rig along those lines (with a homemade cooling block et cetera) right down to the hand built aluminium frame it all sits in (nothing so daggy as a tin case). You can't buy cool like that (and, of course, I'm not referring to water temperature here). Let's face it, any newbie can fiddle with the BIOS, stress his components out a bit and crank up the numbers. But that's not enough these days. It's got to be cooled in some suitably dramatic and eye-catching way.

Here's what works for me:

- First, chuck the case side panels away, and rip out any surplus front blanking plates while you're at it. Forget water, we're talking serious airflow now.
- Hack the mounts around until you can hang the hard drive(s) and CD drive(s) sideways instead of front to back (no functional advantage but it looks individualistic and you can tell your mates that it improves the electron flow relative to the magnetic field emitted by the power supply).
- Ditch the wincy, junky plastic fans that are currently inside. They are so feeble that they won't even suck a piece of paper up against the air inlet holes on a standard rig.

Raid Grandpa's attic for the biggest, nastiest-looking desktop fan you can find – preferably a big 1940s' metal job straight out of a jungle explorer movie. Aim for the sort of power that will have your hair blowing out at right angles and that can comfortably stick a medium-sized cat to the side of a brick wall without slippage. (Anything featuring the propeller from a WWII fighter aeroplane is ideal – extra cred if the plane is still attached). Bolt it to one side of the case.

- Fix a large funnel to the other side of the case and attach the family vacuum cleaner. You might even add a plate saying 'Turbo-Suck'.
- Strap yourself to your chair, plug in and start learning to fend off jealous looks.

None of this will have cost you any money yet, so where do the extra bucks come into the equation? Sorry, I forgot – naturally, you are telling everyone that you bought a chip at around 800MHz and cranked it right up to 1.2GHz, OK? And the numbers are on the screen to prove it. But who can be bothered? For a few extra bucks these days you can simply buy a 1.2GHz Athlon CPU in the first place. Just don't tell anybody, though.

Chris Caudwell

T1

Honesty, integrity and a commitment to customer service. Well, none of these apply to Tel$tra's BigPond Cable service. I signed up for an unlimited cable account (subject to Acceptable Use Policy) over a year ago, and now I find I have a third-rate service that is going to be limited to 3GB per month. Three gigabytes per month works out to be 0.14% of the full capability of the cable service; you can download more on a dialup modem for a third of the price!

How can this happen? You signed a contract, you have done the right thing and paid your bill on time, you don't place a burden on the cable system by leeching huge amounts of data. Well, it seems that Tel$tra can change any or the entire contract to suit themselves, and you and I (the poor customers) have no say – apart from getting out of the contract with no refund of installation costs.

As per usual the independent watchdogs (Telecommunications Ombudsman and ACCC) are once again the toothless tigers allowing big business to do as they please to the customers.What can be done about this? Well, very little, as politicians run the other way for fear of upsetting the apple cart. You and I, the consumer, have only one option open to us, and that is to vote with our feet. This is what I plan to do with my two phone lines, two mobile phones, Foxtel cable service (50% Tel$tra owned) and the icing on the cake, the third-rate BigPond Cable, all of which are with Tel$tra.

Goodbye greedy, ignorant, customer service moronic, heartless, out of touch Tel$tra. Hello uncapped, five times (Tel$tra) allowable download limit, competent help desked, state-of-the-art DOCSIS network Optus. I am sure our relationship will be a long and happy one.

Kent Williams

T2

Why is it that your mag touts a lot about broadband, cable, ADSL, etc., and how great it is, yet we don't see any investigative journalism that looks into and publishes the facts – that Australians are being ripped off something fierce in what they have to pay for broadband?

Why doesn't anyone question why only Sydney and Melbourne have cable and not all of Australia? And how come SDSL (much faster than ADSL) can be had for $AU25 per month (unlimited download) in Sweden – much the same as T2 in the US – and here we're stung with five times the cost for ADSL and pathetic caps on download such that handshaking protocols would use it all? Or, $800 per month to have, again, a pathetic 5.5GB cap.

The government required broadband to be available by whatever date, which it was. But how come they let it be unaffordably priced? Australia wants to be an IT leader, but then gags its own achievement of such with the extortive overpricing of this essential service. How bloody stupid.

When Telstra was owned by all Australians and we were all shareholders, we accepted the term 'large profits' knowing it really meant 'tax'. This seems to have tranquilised us into letting the few who have taken what is ours, and who intend to own it all (if we let John Howard's lot have their way), extort us with excessively overpriced services.

Or, is it possibly the case that this privatised parasite becomes the paying advertisers and thereby immune to probing, so as not to lose a potential meal ticket? Do you have prejudice towards your advertisers?

You pride your magazine on providing researched facts, but how about truth? Let's see the truth of what we are expected to pay for things compared to what they cost elsewhere. Inform us truthfully, so that the extortion is an act of choice and not one of deception. If enough make the right choice the combined influence can be enough to assist all of us.

Redstone

Kent and Redstone's letters are just two of many we received on the subject of Telstra broadband. Telstra has demonstrated repeatedly that negative public sentiment is not a factor to them, which is an arrogance that will damage the company, as it did Intel. We did a story about it on our Web site. We interviewed Patrick Gray from Telstra and his arrogance and disdain for the customer came across as clearly as policy.

The harder they fall, is all we can say.

Pricey piracy

I was interested to read your editorial 'XBoxed into the corner', and your comments about software piracy (atomic, Issue Five). For the most part, I agree with you that piracy is dooming the software market. But I also believe that this scenario is a two-way street.

In my business travels I have met many average PC users (that is, not diehard gamers) that ask me about pirated software, or mention the fact that they know someone who can get software (pirated) for them next door. Most of the time these people aren't looking at doing the wrong thing. They just deem that the software they want to use (Office, games for the kids, and so on) is too expensive to buy, especially after they've just poured $2,000 plus into a system and the OS and then have to spend $1,000 to get some basic software (Office is not cheap).

I also know many gamers who use pirated software, but in general they are pretty good. They use the software, and if it is deemed worth playing in a LAN environment they generally buy the product. However, they go through this process because of price ($89, $99, etc.).

This comes back to another article in your magazine about who wants to pay $99 for something they don't like, or that runs like a piece of @#$% on a user's PC. Yeah, yeah, the user could go out and try to find the demo version or spend 10 hours downloading it from the Net over a slow 33K line (because there is nothing else available).

If software publishers dropped their price to $30 or $40 (and don't try making some bullshit excuse about not being able to make a profit at this price – the managers might have to take a pay cut), I believe that most of the home user and diehard gamer piracy would take a dramatic downturn. Most of the people I have had this debate with have said that if the software was around that price, then they would probably buy it rather than source it elsewhere.

Ghost

SFX sells

Well, having just seen the latest cover of atomic, I had to wonder if I had received the right magazine, or whether this one would be better off in a brown paper wrapper?

I was prepared to let the SFX issue's cover slide, but this cover has totally blown away the idea that it may have been a once-off.

Yes, there are real women in IT now. The numbers are increasing, and the last thing we want to see is a ridiculous magazine cover such as Issue Six.

I personally object to the cover, mainly because I'm fed up with not being able to find a magazine that is purely based on IT/hardware/software etc. that doesn't feel the need to denigrate and patronise the female portion of the IT industry.

Yes, I am female, a qualified tech and well qualified to be able to comment on this subject.

Jo

We're just having a bit of fun, not trying for a 'sex sells' mag.

The text on the cover of the SFX issue was very tongue-in-cheek, the look cheesy and, we think, funny. Issue Six is the same, although I think we would have been better off going with the shot of the model on the contents page, where she's laughing and having a good time.

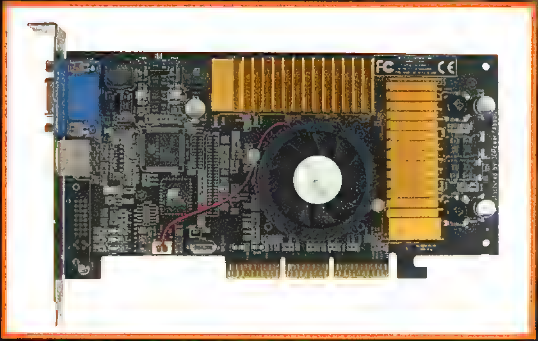
Our other covers have been similarly extreme – taking something everyday and screwing with it, like freezing or x-raying. I apologise if you were offended. That was not the intention.

Send your questions to post@atomicmpc.com.au or by post to:

atomic Letters
PO Box 275,
Beaconsfield,
NSW 2014

WIN GOOD STUFF

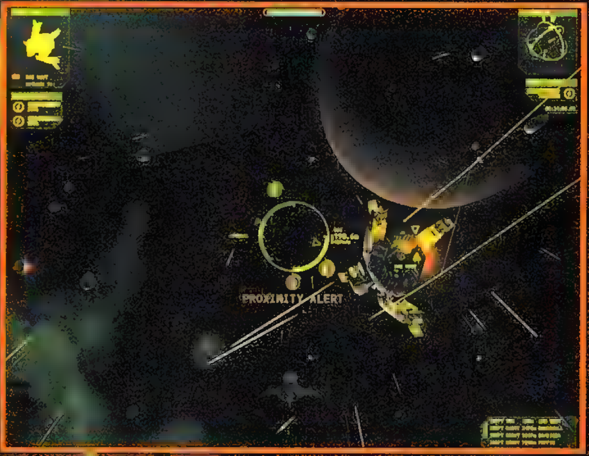
You've arrived at the Orange Page of free shit. The only spending we expect here is a few cents for an envelope and stamp, then you've a slim chance of winning a copy of I-War 2 or a FREE GEFORCE3! Too good, unbelievable.



Morpheus GeForce3

Created by NVIDIA, assembled by new kids 3D Power, packaged in a wooden box and distributed by Innovision (www.innovision.com.au), this GeForce3 r0xx0rs our b0atxx0r. From the black PCB with a sexy purple cooler to the chunky RAMsinks that cover the ultra-fast 3.8 nanosecond RAM, the Morpheus is also the most stylish GeForce3 out there. As the winner of our GeForce3 showdown, it's the card to have. Thanks to the big-hearted champions at Innovision we're giving away the winning card, which is incredible.

Q. Why aren't computer chips made out of wood?



I-War 2: Edge of Chaos

Big bad space combat gaming that comes close to achieving the Holy Grail of the complete gameworld in which you can do as you please. I-War 2 makes you feel, like, really spaced out. Win yourself a copy of this bloody good game, thanks to OziSoft. Thanks, OziSoft.

Q. Who is officially credited with discovering the distance between Earth and the sun?

atomic 5 winners

Belkin Bus Station

Q. Through which countries did Cliff Richards' bus travels take him in 'Summer Holidays'?

A. UK, France, Switzerland, Austria, Yugoslavia, Greece

- L. Morton, Aspley, Qld

Terms and Conditions of Entry. 1. The Promoter is AJB Publishing ACN 083 063 914 of Unit 3/5 44-70 Rosehill Street, Redfern, NSW 2016. Promotion Period is from 9.00am on 18/07/01 until 12.00pm on 28/08/01.
2. Entry is open to residents of Australia and New Zealand. Management and employees of AJB Publishing Pty Ltd, and their immediate families, and any advertising, marketing or promotional firms associated with this promotion are not eligible to enter. 3. Entry by posting answers to AJB Publishing Pty Ltd. 4. The draw will be held at offices of AJB Publishing at 5.00pm on 28/08/01. Winners will be notified by mail & published in *atomic*. 5. The prizes are not transferable or exchangeable and cannot be taken as cash. 6. The judge's decision is final and no correspondence will be entered into. 7. The Promoter reserves the right to publish the winner's name and suburb for promotional purposes. 8. All entries will become the property of AJB Publishing Pty Limited.

E.N.G.A.G.E

Q. Which fighter pilot, in any conflict, has the highest number of confirmed kills and how many did he score?

A. Major Erich Harman, 352 killed.

- R. Viner, Englemont, Vic.
- G. Semmler, Calwell, ACT
- D. Meldrum, Sapphire, Qld
- J. Gill, Emerald, Qld
- S. Thomas, Wynn Vale, SA
- M. Hall, Asquith, NSW
- F. Canas, Booker Bay, NSW
- J. O'Keeffe, Carpendett, Vic.
- S. Kennedy, Golden Grove, SA
- M. Brondou, Thornbury, Vic.
- M. Baker, Orbust, Vic.
- M. Sheard, Thornbury, Vic.

Tribes 2

Q. What was Frankie Goes to Hollywood's first Australian Top 10 hit?

A. 'Relax'

- J. Stetin, Glenbrook, NSW
- E. Bell, Naremburn. NSW
- D. P. Koun, Kingswood. NSW
- R. McDonald, Waverley. NSW

Please send all entries to:
atomic
Competition Name
PO Box 275,
Beaconsfield, NSW 2014

Closing date for entries is August 28, 2001. Winners will be announced in atomic 9.

atomic warehouse

The goods stashed in the atomic Warehouse represent quality, no doubt there. Quantity though, is what's really in abundance. There's everything here. Everything computery, at least. We bundled all these informative, encyclopaedic adverts in one bunch up the back, so you, with but a quick flick of the wrist, can come out on top. The Warehouse is also sort of like a microcosm of hardware prices, in a stock market kind of way. Keep track of the unbelievable depreciation rate of your current rig, while planning your next system – whether it be an upgrade or all-new system. Let's just say that again because it feels good, everyone at home shout it out with me now, ready, go: "A whole new system!" Felt good huh?! Here's where you can turn the magic into reality.

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www.fortecomputers.com.au

SINCE 1987

PROCESSORS

Intel Celeron 733A (oem) (S370)	$166
Intel Celeron 766A (oem) (S370)	$178
Intel Celeron 800A (oem) (S370)	$191
Intel Celeron 850A (oem) (S370)	$222
Intel Pentium III-866/133 (S370)	$398
Intel Pentium III-933/133 (S370)	$441
Intel Pentium III-1000/133 (S370)	$468
Intel Pentium 4-1.3GHz	$650
Intel Pentium 4-1.4GHz	$671
Intel Pentium 4-1.5GHz	$963
Intel Pentium 4-1.7GHz	$995
AMD Duron 750 (oem) (Socket A)	$102
AMD Duron 800 (oem) (Socket A)	$122
AMD Duron 850 (oem) (Socket A)	$163
AMD Athlon K7- 900T 3D (oem) (Socket A)	$276
AMD Athlon K7- 950T 3D (oem) (Socket A)	$343

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Abit KT7A (VIA, Soc-A)	$268
Abit KT7A-RAID (VIA, Soc-A, U-100 RAID)	$343
Abit VL6 (VIA, S370, U-66, AGP 2x)	$153
AOpen MX34 (VIA, S370, Audio, M-ATX, 133)	$189
AOpen MX3S (815, S370, M-ATX, All-in-One)	$286
Asus CUSI-M (SiS, S370, M-ATX, VGA, LAN, Audio)	$165
Asus CUSL2 (815, S370, U-100, VGA, AGP Pro 4x)	$346
Asus CUSL2-C (815, S370, U-100, AGP Pro 4x)	$272
Asus CUV-4XE (VIA, S370, AGP Pro 4x, 133)	$260
Asus CUV-4XD (VIA, S370, AGP Pro 4x, 133)	$390
Asus A7V-E (VIA, Soc-A, U-100)	$261
Asus A7V/133 (VIA, Soc-A, U-100) (Raid)	$341
Asus K7V-T (VIA KX133, Slot-A, U-66)	$296
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Asus A7M/266 (VIA, Soc-A, U-100)	$399
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MSI K7T Pro 2A (VIA, Soc-A, Audio) OEM	$240
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MSI 6368 (w/LAN) (S370,M-atx,vga,lan,audio,agp,u-100)	$169
MSI PRO 266 Master R (Pro266,S370) #MS6366	$354
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20Gb Quantum FB AS U-100 2M 7200	$221
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Vitesse DDR

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- 256MB PC2100 DDR SDRAM
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- Hercules GameTheatre XP
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- Inwin 508 Midi-tower (300W PSU)
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AMD Athlon 1GHz DDR	$2276
AMD Athlon 1.2GHz DDR	$2321
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Step 2. Choose your video card	
Prolink 64MB GeForce2 MX200	$170
Hercules 64MB 3D Prophet 4500	$151
Gainward 64MB GeForce2 Pro	$290
Prolink 64MB GeForce3	$408
Hercules 64MB GeForce3	$819
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Hitachi CM772 19" Monitor (Flat)	$90
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Hitachi CML17XE 17" TFT	$2,32
Mitsubishi DV17NF 17" Monitor (Flat)	$57
Mitsubishi DV19NF 19" Monitor (Flat)	$98
Philips 107E21 17" Monitor	$36
Philips 107P10 17" Monitor (Flat)	$58
Philips 109P20 19" Monitor (Flat)	$1,09
Philips 201P10 21" Monitor (Flat)	$2,02
Samsung 753DF 17" Monitor (Flat)	$47
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Asus V7700 64MB GeForce2 Deluxe	$696
Asus V8200 64MB GeForce3 Deluxe	$965
Gainward 64MB GeForce2 Pro	$425
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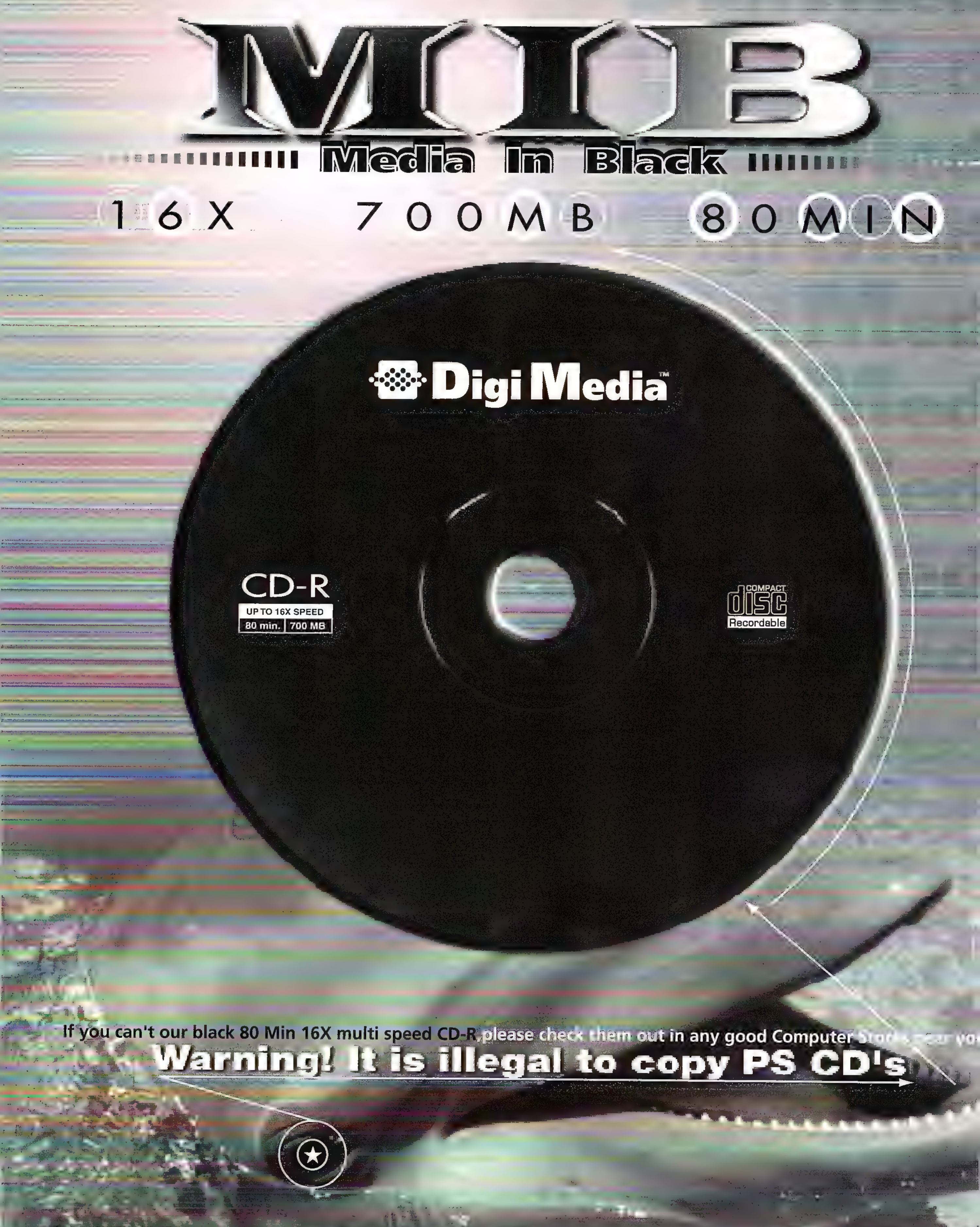
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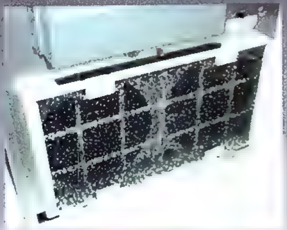
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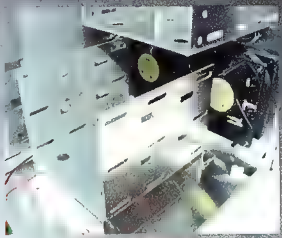
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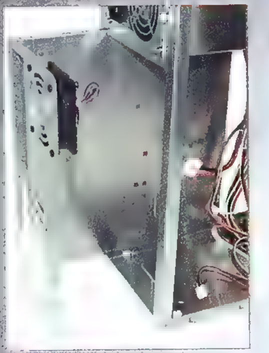
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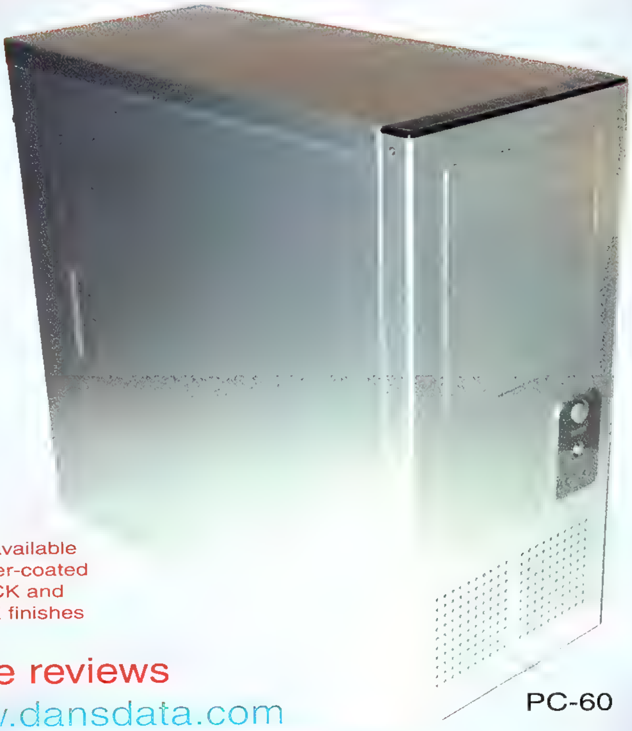
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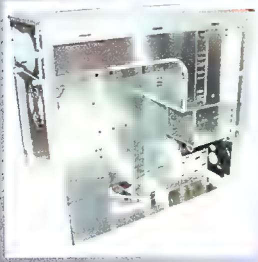

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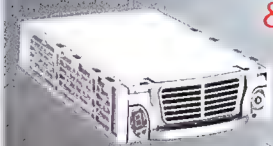
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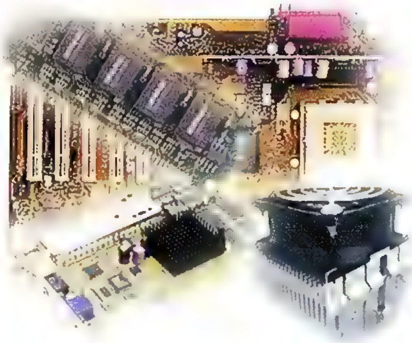

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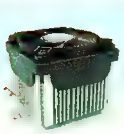

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AUP mania

After the outcry following Telstra's decision to change its Acceptable Use Policy (AUP) to limit 'free' downloads to 3GB per month, it is high time that everybody starts adopting similar policies. Here are a few of the potential things that are crying out for regulation, and our suggestions for stopping them.

- MP3 AUP – In order to protect the sensitive ears of the listening public, any MP3 file put up for download using a file sharing service should: a) be sampled at a minimum bit rate of 128KB/s; b) be free of any appearance of Limp Bizkit; and c) not include 10 minutes of bandwidth-wasting silence just to get in the 30-second 'hidden' track at the end of an album.
- IRC AUP – Anyone pretending to be a teenage girl should preface any conversation with, 'Hello, I am actually a 50-year-old man, and I am naked at the moment'. Trout slapping should be limited to once per day and, frankly, no-one wants to know what MP3s you are listening to.
- Chain Email AUP – Just because it's in email form it is still a chain letter. You are deluding yourself if you think some kid will get an organ transplant if eight of your friends forward the email to eight of their friends.
- l3375P34K AUP – Short and sweet. The use of numbers is prohibited to three per sentence.
- CaPiTaLiSaTiOn AUP - An overarching set of guidelines designed for both companies and individuals. The use of capitals is limited to one every five letters. This is designed to reduce the tendency of companies to name their products in all capitals, as well as reduce the amount of shouting done by people on forums, email and IRC. Perhaps the worst violation of this AUP involves the incessant use of alternating capitals.
- LOL AUP – Laughing Out Loud is fine, but it really should be made in reference to something someone else has said. There is no acceptable reason in any circumstance for adding LOL in reference to your own comment.
- Forum AUP – Every post made on any forum should be deemed to: a) contribute to the development of humanity; b) have relevance to at least one other forum user; or c) be incredibly funny. Bland, uninteresting or just plain sucky posts should be relegated to somewhere that no-one looks, such as the official Daikatana forums.
- Spam AUP – For health considerations, tinned ham should only be consumed in rare, possibly desperate, circumstances. Alternatives to opening a fresh tin include gathering fruits and berries, begging or gnawing on one's own arm.
- Online Gaming AUP – To be considered a true online gamer one must: a) not sleep until 2am each morning; b) spend a maximum of 10 minutes per day interacting with friends and family; and c) have at least cancelled a dream date once in order to play a clan match.

After a long and arduous judging process, Captain Atomic's sidekick has been named. From the multitude of great suggestions there could only be one winner, and that winner is Wilkshake. He is now the envy of his friends with his new ASUS V8200 Deluxe GeForce3, supplied by the great guys at CASSA (www.cassa.com.au).

CAPTAIN ATOMIC
She's the TOP graduate from my college Majoring in SUPER HEROICS with a MODELING Minor!
Her Name is ULTRA VIOLET And her powers are AWESOME!
This is her yearbook photo . . .
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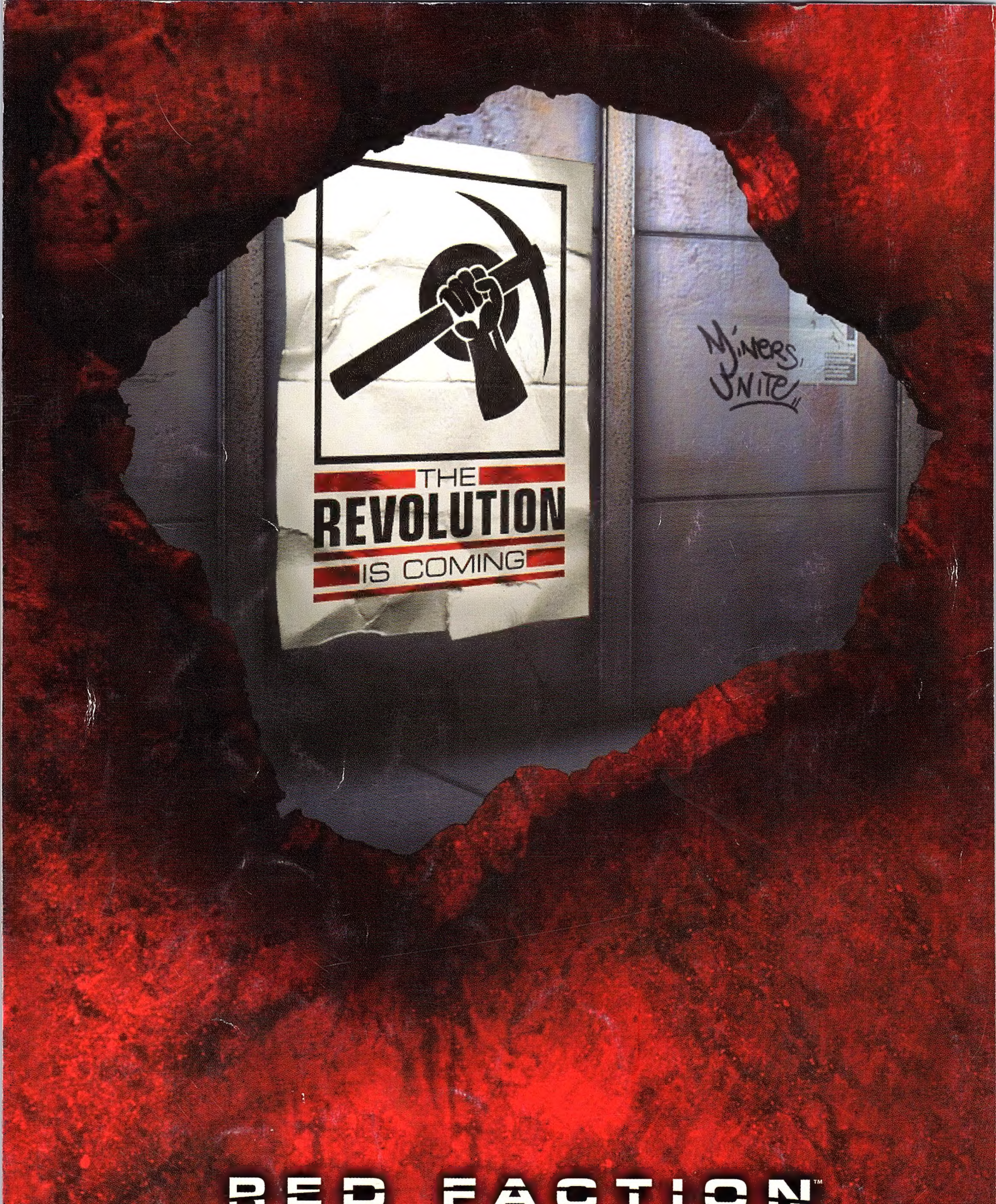

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